

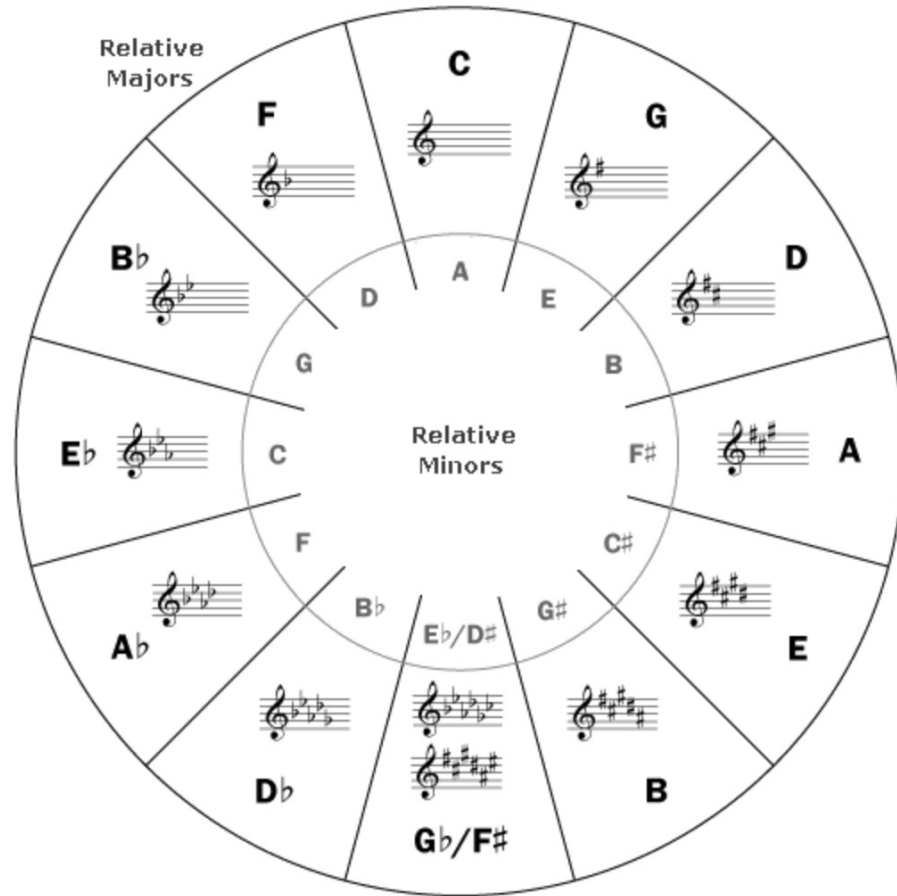
Music Scales and Diatonic Chords Generator

Compute and display music scales and (optionally)
diatonic chords, or the composition of a chord/triad.

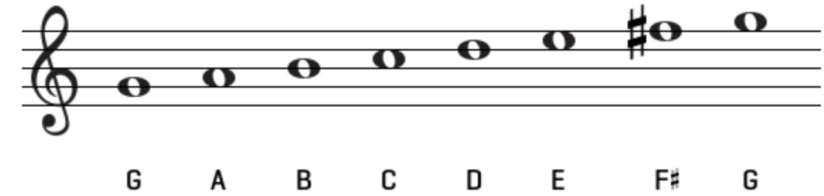
Final Project for CS50P
by Antoine Reid (Montréal, QC, Canada)

Major and minor scales, the circle of fifths

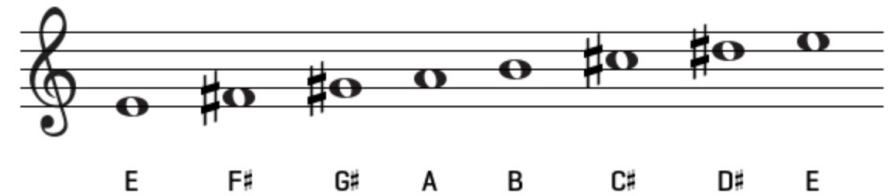
- Some scales use sharps and some scales use flats



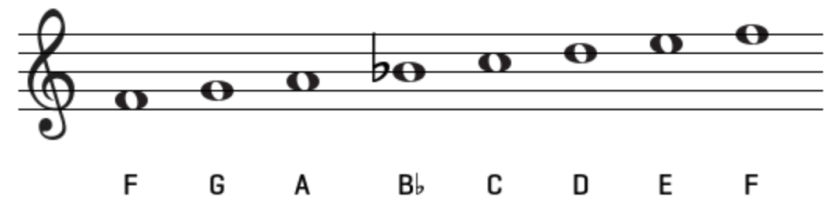
G major scale



E major scale



F major scale



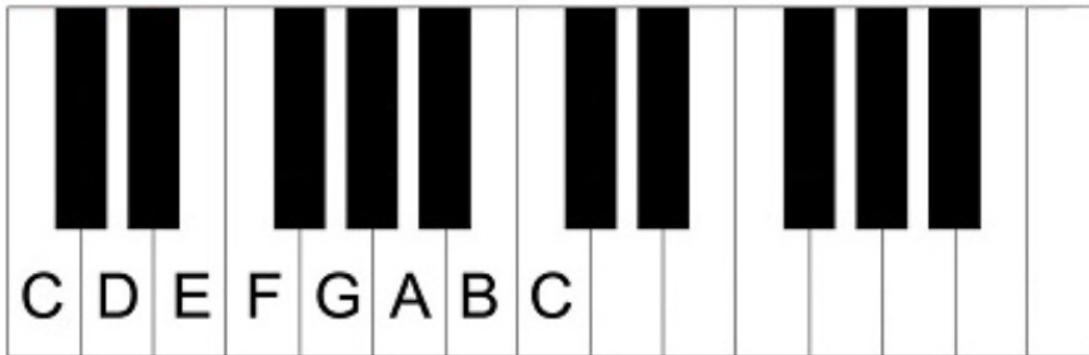
References:

- <https://www.apassion4jazz.net/circle5.html>
- <https://www.basicmusictheory.com/>

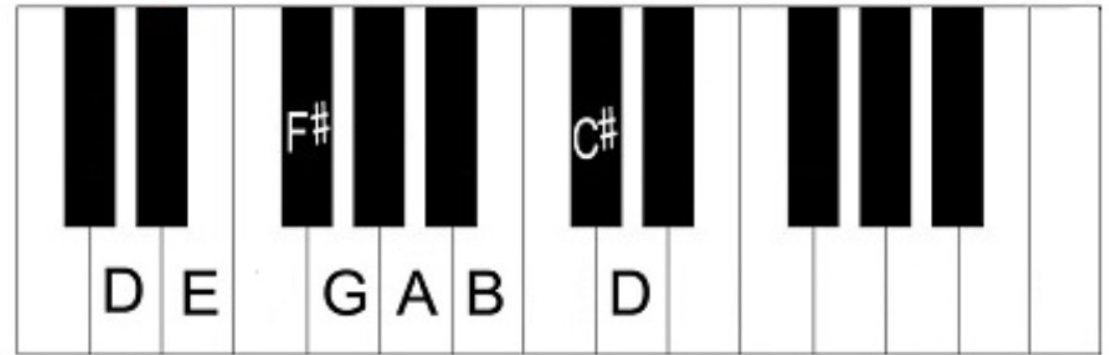
Major scale

- Major scale formula: W – W – H – W – W – W – H

C major scale:



D major scale:



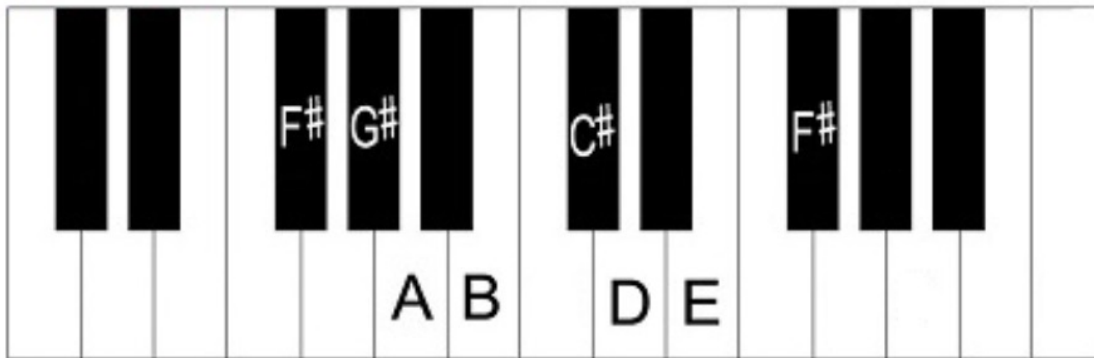
References:

- <https://www.piano-keyboard-guide.com/piano-music-scales.html>

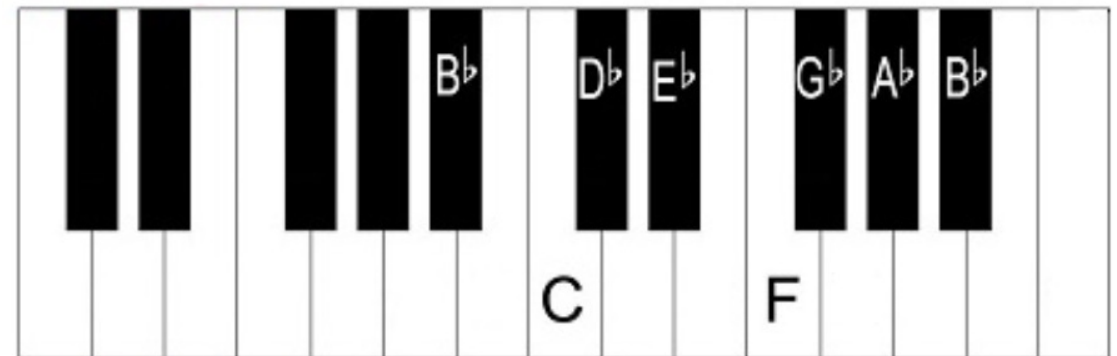
Natural minor scale

- Natural minor scale formula: W – H – W – W – H – W – W

F# minor scale:



Bb minor scale:



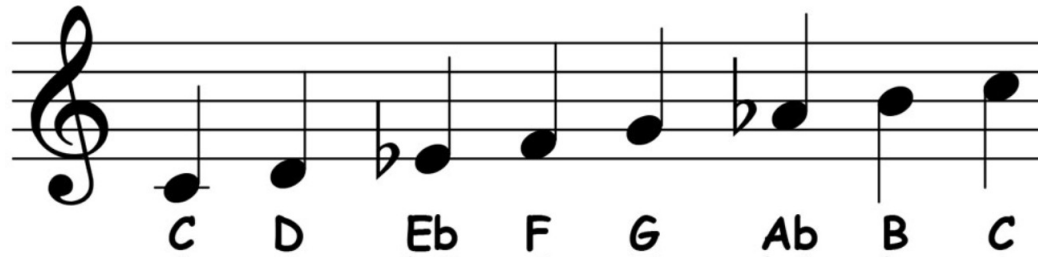
References:

- <https://www.piano-keyboard-guide.com/piano-music-scales.html>

Other minor scales

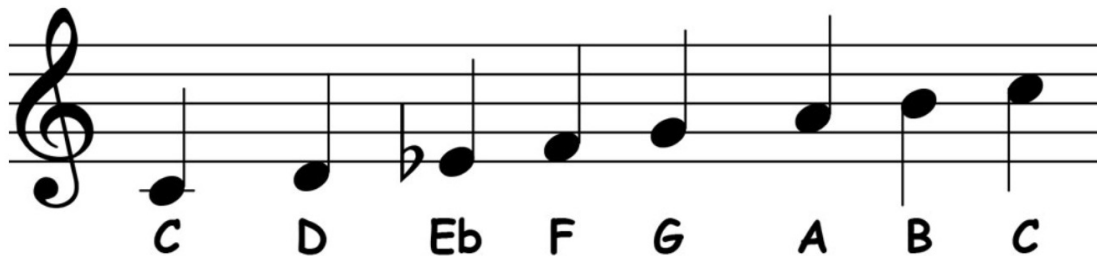
- Harmonic minor scale formula: $W - H - W - W - H - 1\frac{1}{2} - H$

Example: C Harmonic minor scale



- Melodic minor scale formula: $W - H - W - W - W - W - H$

Example: C Harmonic minor scale



References:

- <https://www.pianotheoryexercises.com/scales/natural-vs-harmonic-vs-melodic/>
- <https://piano-ology.com/scales-harmonic-minor-theory-ear-training/>
- <https://piano-ology.com/scales-melodic-minor-theory-ear-training/>

Using the scale generator

- The generator uses command-line arguments
- The generator supports any key signature in major, natural minor, harmonic minor and melodic minor scales
- The generator can also show the diatonic chords for the selected scale
- By adding the verbose flag, chords are more clearly identified (minor, diminished, augmented)
- Here are some examples:

```
$ ./project.py -s E -t major -d
```

Notes for the E Major scale:

1	2	3	4	5	6	7	8
E	F#	G#	A	B	C#	D#	E

Diatonic chords for the E Major scale:

Degree	Chord	Triad
I	E	E - G# - B
ii	F#m	F# - A - C#
iii	G#m	G# - B - D#
IV	A	A - C# - E
V	B	B - D# - F#
vi	C#m	C# - E - G#
vii°	D#°	D# - F# - A

```
$ ./project.py -s C# -t minor -d
```

Notes for the C# Natural Minor scale:

1	2	3	4	5	6	7	8
C#	D#	E	F#	G#	A	B	C#

Diatonic chords for the C# Natural Minor scale:

Degree	Chord	Triad
i	C#m	C# - E - G#
ii°	D#°	D# - F# - A
III	E	E - G# - B
iv	F#m	F# - A - C#
v	G#m	G# - B - D#
VI	A	A - C# - E
VII	B	B - D# - F#

```
$ ./project.py -s Gb -t melodic -d -v
```

Notes for the Gb Melodic Minor scale:

1	2	3	4	5	6	7	8
Gb	Ab	Bbb	Cb	Db	Eb	F	Gb

Diatonic chords for the Gb Melodic Minor scale:

Degree	Chord	Triad
i	Gbm (min)	Gb - Bbb - Db
ii	Abm (min)	Ab - Cb - Eb
III+ (aug)	Bbb+ (aug)	Bbb - Db - F
IV	Cb	Cb - Eb - Gb
V	Db	Db - F - Ab
vi° (dim)	Eb° (dim)	Eb - Gb - Bbb
vii° (dim)	F° (dim)	F - Ab - Cb

Using the scale generator (cont'd)

- The generator can also show the notes of a triad (major, minor, diminished or augmented)
- Here are some examples:

```
$ ./project.py -c Bbm -v
```

Notes in chord Bbm (min):

Chord	Triad
Bbm (min)	Bb - Db - F

```
$ ./project.py -c G#o -v
```

Notes in chord G#° (dim):

Chord	Triad
G#° (dim)	G# - B - D

```
$ ./project.py -c Ab+ -v
```

Notes in chord Ab+ (aug):

Chord	Triad
Ab+ (aug)	Ab - C - E