

## Notes, Octaves, Scales and Modes

The interval we call an octave is a simple mathematical relationship – the higher note is vibrating twice as fast as the lower. So in modern concert pitch, the A above middle C is 440Hz, the A an octave above that is 880Hz, the A below middle C is 220Hz.

In modern western music, we divide an octave into 12 equal intervals we call semitones. So, each semitone is "the twelfth root of two" or 1.059463 times faster frequency than the one below. We chose 12 because several of them are very close to simple mathematical ratios with the base note and hence sound nice. The ratio of a "Fifth" (7 semitones) is 3:2, so the upper note makes three vibrations in the same amount of time that the lower note makes two. The pitch ratio of a "Fourth" (5 semitones) is 4:3, and of a 'Major Third' (4 semitones) is 5:4.

♩ = 120

**Semitone Scale**

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Western music then chooses 7 notes out of the 12 to make an octave scale of five tones and two semitones. One common example is the major scale which goes TTSTTTS (T=whole tone, S=semitone). This and the other possible harmonious choices are called the seven heptatonic modes. It is easiest to play them all by starting on each of the seven white notes of the piano.

♩ = 120

**Diatonic Scales on Natural Notes**

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**Ionian Mode I (C Maj) TTSTTTS****Dorian Mode II (D Dor) TSTTTST****Phrygian Mode III (E Phr) STTTSTT****Lydian Mode IV (F Lyd) TTTSTTS****Mixolydian Mode V (G Mix) TTSTTST****Aeolian Mode VI (A Min) TSTTSTT****Locrian Mode VII (B Loc) STTSTTT**

Here are the seven modes again, this time, starting on the same note (C). You can see how the different positions of the two semitone intervals gives more sharps or flats.

♩ = 120

**Heptatonic Modes starting on C**

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**Ionian Mode I (C Maj) TTSTTTS****Dorian Mode II (C Dor) TSTTTST****Phrygian Mode III (C Phr) STTTSTT****Lydian Mode IV (C Lyd) TTTSTTS****Mixolydian Mode V (C Mix) TTSTTST****Aeolian Mode VI (C Min) TSTTSTT****Locrian Mode VII (C Loc) STTSTTT**

I chose C as the start note for simplicity, but you can create the seven modes starting on any of the 12 notes of the semitone scale (e.g. F#Maj, F#Dor, F#Mix, etc).

Only four of the modes are used commonly in British Isles folk music – Ionian (Major), Dorian, Mixolydian, and Aeolian (minor). Here are the four common modes again, firstly in one sharp and then in two sharps.

♩ = 120

**Common Modes in one sharp**

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**Ionian Mode I (G Maj) TTSTTTS****Dorian Mode II (A Dor) TSTTTST****Mixolydian Mode V (D Mix) TTSTTST****Aeolian Mode VI (E Min) TSTTSTT**

♩ = 120

**Common Modes in two sharps**

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**Ionian Mode I (D Maj) TTSTTTS****Dorian Mode II (E Dor) TSTTTST****Mixolydian Mode V (A Mix) TTSTTST****Aeolian Mode VI (B Min) TSTTSTT**

Here are examples of a typical tune in each common mode, all with one sharp:

Waltz  
♩ = 100

### Amazing Grace (GMaj)

Carrell and Clayton 1831  
USA

Musical notation for 'Amazing Grace' in G Major, 3/4 time. The piece consists of two staves. The first staff shows the melody, and the second staff shows the bass line with a triplet of eighth notes and a final chord of G. The key signature has one sharp (F#).

March  
♩ = 80

### Childgrove (ADor)

Trad. Playford 1701  
England

Musical notation for 'Childgrove' in A Dorian mode, 2/2 time. The piece consists of two staves. The first staff shows the melody, and the second staff shows the bass line with a final chord of Am. The key signature has one sharp (F#).

Reel  
♩ = 180

### Campbell's Farewell to Redcastle (DMix)

Trad.  
Scotland

Musical notation for 'Campbell's Farewell to Redcastle' in D Mixolydian mode, 4/4 time. The piece consists of three staves. The first two staves show the melody, and the third staff shows the bass line with a final chord of D. The key signature has one sharp (F#).

Polka  
♩ = 100

### Bear Dance (Em)

Trad.  
Flanders

Musical notation for 'Bear Dance' in E minor mode, 2/4 time. The piece consists of two staves. The first staff shows the melody, and the second staff shows the bass line with a final chord of Em. The key signature has one sharp (F#).

Although all four tunes have the same key signature, each has a definite 'home' note (the first/last note of the scale) and usually finishes on it. The 'A' part of folk tunes may end on the home note, but if not, it often pauses a fifth above (e.g. D if key is GMaj), as this leads on to the 'B' part, as in Amazing Grace above.

That's enough for now!