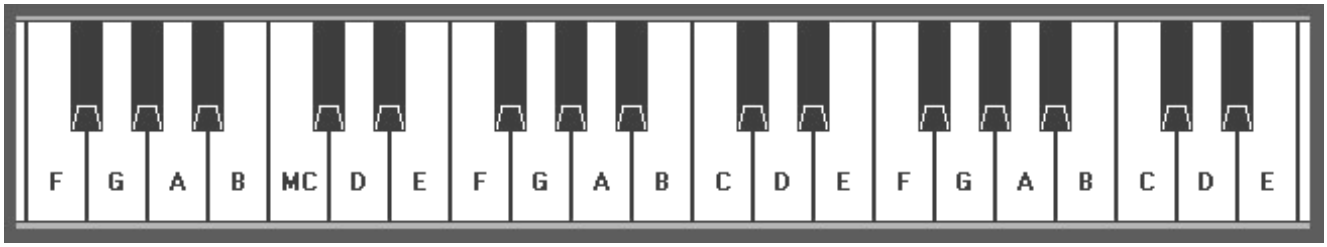
Music Basics



The smallest interval in pitch between two successive notes is a “semitone”.
(C to C# = 1 semitone) (C to D = 1 tone).
O*ther terms used are ‘half step’ [semitone] and ‘one step’ [tone].*

On a piano keyboard, all white notes are “naturals” (♮) and black notes are sharps (#) and flats (b). Any black note can be referred to as either a sharp or a flat depending on the context. For example, the black note between F♮ and G♮ can be referred to as either F# or Gb depending on the context of the scale, the chord or key signature of the passage.

An international standard pitch reference was established in 1939 to provide compatibility throughout the music world. The standard was expressed in a statement that “Concert A” *[A above middle C]* would have a frequency of 440 Hz. The lowest note on a 88 note piano has a frequency of 27.5 Hz with the frequency doubling per ascending octave. The highest note on a 88 note piano has a frequency of 4,180 Hz. Concert A has a frequency of 440 Hz and the next A ascending *[1 octave]* has a frequency of at 880 Hz. A simple recognition of the basic maths involved here may perhaps provide a better understanding of ‘octaves’.

Scales

A major scale comprises 8 notes and is constructed using the following ascending intervals *(the 8th note is an octave repetition of the 1st).*

Tone, tone, semitone, tone, tone, tone, semitone (T, T, S, T, T, T, S).

Use of this formula results in the following sequence of notes for the scale of C maj;
C, D, E, F, G, A, B, C *(all naturals, all white keys).*

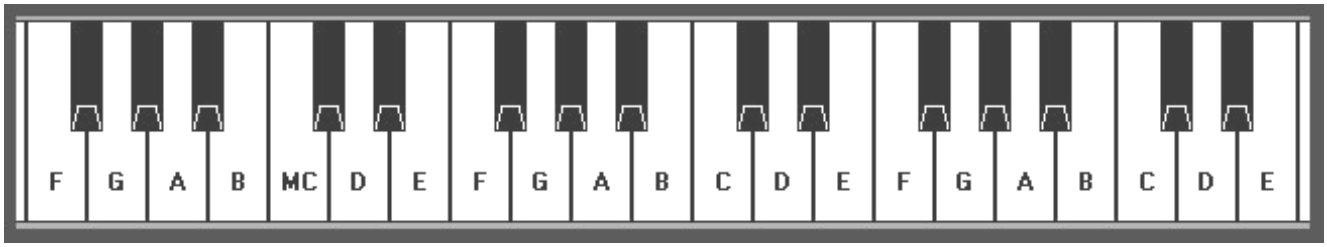
Another example using the same formula - D maj; (D, E, F#, G, A, B, C#, D).

An ascending major scale can be built on any note using this formula. *It is interesting that many people mistakenly perceive a major scale as a series of equal steps.*

There are several forms and modes of minor scales. The note sequence in each is determined in a similar manner.

There are 12 unique notes in an octave and each note provides the base *[root]* for a major scale. There are actually more than 12 major scales because some notes have alternate *[enharmonic]* names; for example, F# and Gb are the same note *[see keyboard illustration]* but each have a distinctive identity and scale. *(There are actually 13 notes in an octave span if the upper tonic is included - for example, the low C and the high C in a C maj scale.)*

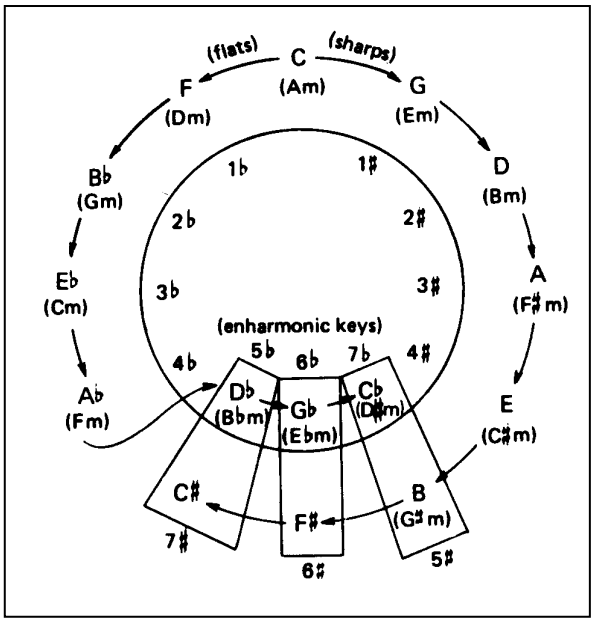
Symbols are used to change the pitch of a particular note that is not included in the relevant key signature. Symbols used in this context are called ‘accidentals’. A ‘flat’ (b) lowers the pitch 1 semitone, a ‘sharp’ (#) raises the pitch 1 semitone and a ‘natural’ (♮) indicates that the note remains unchanged from its basic pitch *[a white note].* Double flats (bb) and double sharps (##) or (x) are also used, but less frequently.



Keys

Recognising that a passage of music comprises notes separated by quantified intervals of pitch, it can be appreciated that the passage as a whole, can be positioned anywhere within the lower and upper limits of the musical instrument, or vocalist's range. If a shift up or down is made later, *[transposed]* the pitch and notation change but the intervals remain the same. The placement and any subsequent shift is dependent on various considerations and of course is limited by the range of the musical instrument or vocalist.

A major scale built on any note other than C♮ will contain one or more sharps or, one or more flats.



A rule called "The Circle Of Fifths" is helpful in identifying the order of the various keys, and is used in the following manner;

Starting with the note of C on the piano keyboard, *(key of C, no sharps or flats)* begin counting from C as 1 and proceed up the major scale to the 5th interval (G♮). This procedure will identify the next scale with sharps *[in this first case, 1 sharp]* as G. If we now build an ascending major scale on this note (G♮), using the standard formula, it will be necessary to use 1 sharp to comply with the formula. Proceeding to a conclusion it will be seen that the scale of G major comprises the following notes –
G, A, B, C, D, E, F#, G.

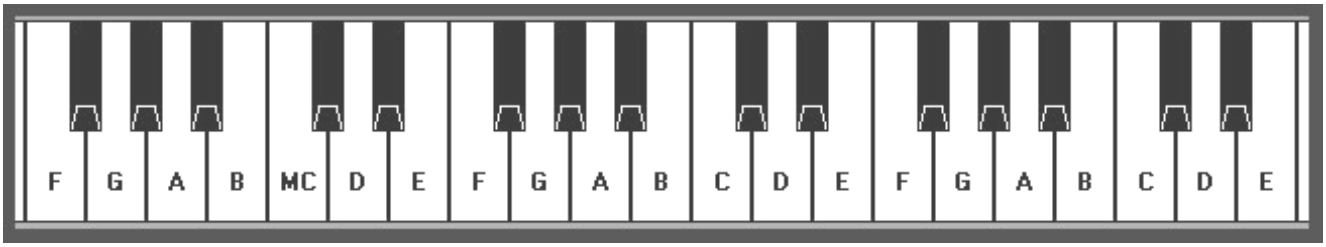
Similarly, to identify the next scale, *[with sharps]* count up the G major scale, on the piano keyboard, to the 5th interval commencing with G♮ as 1. This procedure will identify that the next scale is D. If we now build a major scale on this note (D♮), using the standard formula, it will be necessary to use 2 sharps to comply with the formula. Proceeding to a conclusion it will be seen that the scale of D major comprises the following notes – D, E, F#, G, A, B, C#, D.

Repeat this procedure to identify the remaining 5 scales having 3, 4, 5, 6 & 7 sharps respectively.

A similar procedure is used to identify the order of scales that have 1 or more flats. The one difference is that the successive 5th steps are descending rather than ascending.

Count down the C major scale on the piano keyboard starting from C as 1, to the 5th interval (F♮). This procedure will identify that the next scale with flats *[in this first case, 1 flat]* is F. If we now build an ascending major scale on this note (F♮), using the standard formula, it will be necessary to use 1 flat to comply with the formula.
Proceeding to a conclusion it will be seen that the scale of F major comprises the following notes –
F, G, A, Bb, C, D, E, F.

Repeat this procedure to identify the remaining 5 scales having 3, 4, 5, 6 & 7 flats respectively.

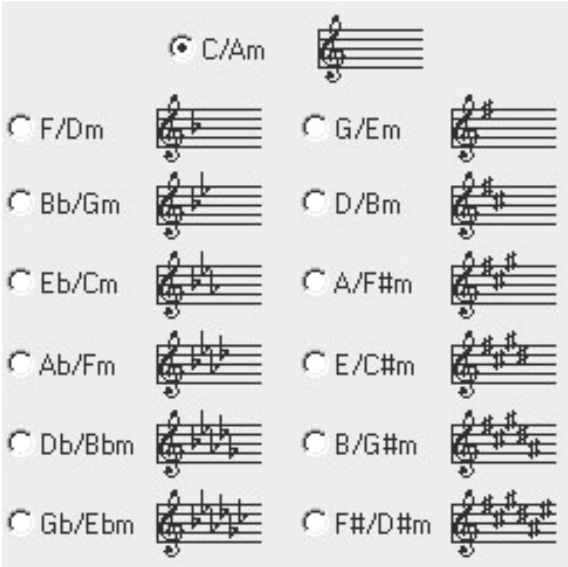


Continue in a similar manner and count down the F major scale to the 5th interval commencing with F♮ as 1. This procedure will identify the next scale *[with flats]* as Bb. If we now build an ascending major scale on this note (Bb), using the standard formula, it will be necessary to use 2 flats to comply with the formula. Proceeding to a conclusion it will be seen that the scale of Bb major comprises the following notes –
Bb, C, D, Eb, F, G, A, Bb.

Figure 2 illustrates the sequence that sharps and flats are added to the various keys. It can be seen that when one sharp is present in the key signature, that sharp will always be F# and the key signature will always be G maj. Likewise, if 2 sharps are present in the key signature the two, in order, will always be F#, and C# and the key signature will always be D maj. This pattern applies to all key signatures and should be committed to memory.

Note that scales are built in ascending order using the formula. When counting up or down the various major scales to determine the 5th interval, ensure that the key signature of that scale is observed. For example, when counting down to the 5th interval from F, the count ends on Bb not B♮ because of the observance of the relevant key signature.

figure 2



Each major scale has a related minor scale, with both having the same key signature.

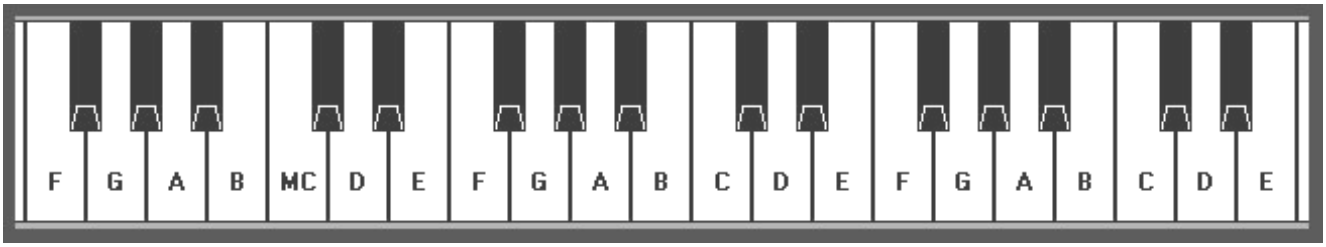
Enharmonic notes and Keys

F# and Gb are the same note on a keyboard and obviously have the same pitch. However, each has a distinctive identity in theory and written notation.

The scale of **F#** contains 6 sharps and comprises F#, G#, A#, B, C#, D#, E#, F#
A F#7 chord would comprise F#, A#, C#, E.

The scale of **Gb** contains 6 flats and comprises Gb, Ab, Bb, Cb, Db, Eb, F, Gb
A Gb7 chord would comprise Gb, Bb, Db, E.

A more common example of enharmonics can be seen in the use of flat and sharp symbols for accidentals. If the passage has a key signature containing one or more flats, the standard practice is to show accidentals as flats (b). Likewise, sharps when the key signature has one or more sharps.



Chord formulae

Maj	1	3	5	
Min	1	b3	5	
Dim	1	b3	b5	
Aug	1	3	#5	
Maj 6th	1	3	5	6
Min 6th	1	b3	5	6
7th	1	3	5	b7
Maj 7th	1	3	5	7
Min 7th	1	b3	5	b7
Dim 7th	1	b3	b5	bb7

The notes in a chord derive from a simple formula and all types of chords can be assembled once the formulae are known. Always ensure that the relevant key signature is observed when assembling chords, as with scales.

For example, using the table of formulae at right, an F minor seventh chord (Fm7) would comprise;
(**F** *tonic*), (**Ab** *flattened 3rd*), (**C** *5th*), (**Eb** *flattened 7th*).

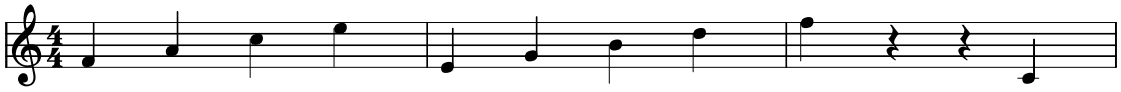
The notes in any particular chord may be arranged with different ascendancy and identified using the terms "1st inversion", "2nd inversion" etc.

More complex chord construction adds 9ths, 11ths and 13ths and provides for individual notes to be sharpened or flattened.

The sequence of chords in a passage of music form identifiable patterns, and these patterns can be expressed in mathematical terms. There are many such patterns of course, however, many popular songs share identical sequences. Certain chord sequences *[progressions]* create an unresolved expectation to the listener whilst others provide a sense of finalisation *[tension and release].* These considerations are fundamental to composing and arranging.

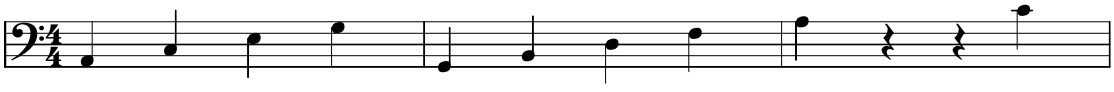
Notation (names of the 4 spaces and 5 lines in the two common clefs).

Treble Clef

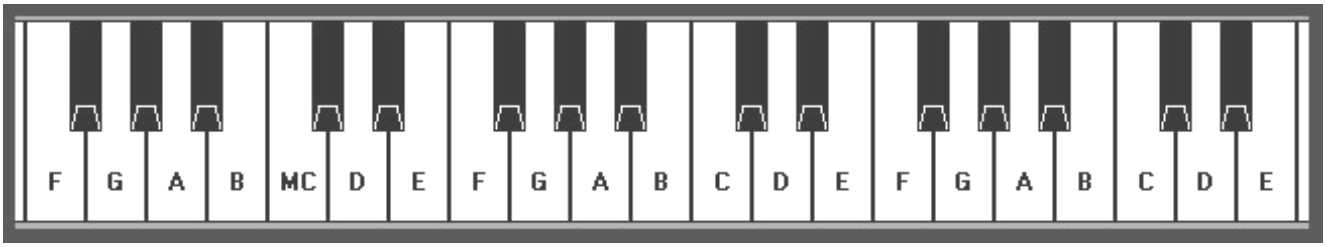


F A C E E G B D F Middle C

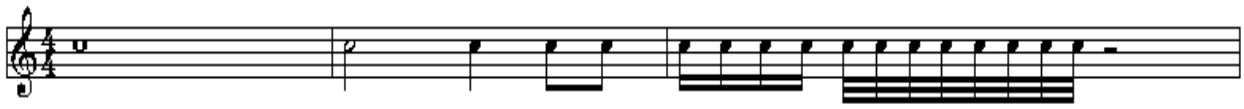
Bass Clef



A C E G G B D F A Middle C

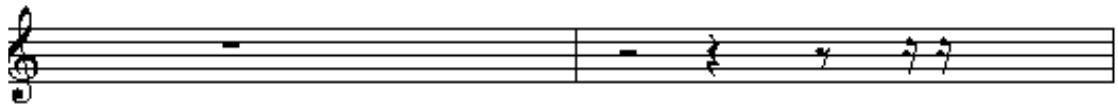


Notes



Whole Half Quarter Eighth Sixteenth Thirty Second

Rests



Whole Half Quarter Eighth Sixteenth

A dot following a note or rest increases its value (duration) by one-half.

Alternate names for notation and rests

(Whole = Semibreve), (Half = Minim), (Quarter = Crotchet), (Sixteenth = Semi-quaver),
(Thirty Second = Demisemi-quaver).

Time Signatures

$\frac{4}{4}$ $\frac{2}{4}$ $\frac{3}{4}$ $\frac{6}{8}$ $\frac{6}{4}$ $\frac{9}{8}$ $\frac{12}{8}$ $\mathbf{C}$ $\mathbf{\cent}$

The above examples cover most of the time signatures in use. The top number indicates the number of beats per bar and the bottom number indicates the time value of the note *[identifies type of note]* that has been apportioned one beat. For example, $\frac{4}{4}$ indicates that there are 4 beats per bar and 4 quarter notes in each bar *(or a mix of notes that sum to this)*.

The perceived beats or pulses per bar will not always be in accord with the preceding explanations due to the wide range of tempos and rhythms in common use. For example, 'march' tempo with a 6/8 time signature generates a definite 2 beat pulse *(3 x eighth notes per beat, resulting in a triplet feel or style).* A slower musical piece with the same 6/8 time signature can generate an obvious, and sometimes unwanted um-pah-pah 3/4 waltz rhythm. This can happen when the basic 6 x eighth note format *[rhythm]* becomes split into 2 distinctive sets of 3 pulses - *(Silent Night is an example where this potential exists).*

The C symbol indicates 'Common Time', - ie, upper and lower numbers are common. This symbol is sometimes used in lieu of the $\frac{4}{4}$ symbol. The C with the vertical line indicates 'Cut Time'. This time signature is characterised by a passage that is written on the basis of 4 x quarter notes per bar, or the equivalent, but has an obvious 2 beat pulse.