

## An Introduction to Diatonic Harmony

(Jordan Humber 2007)

This essay comprises a selection of topics that together, help to bring understanding to the topic of *diatonic harmony*. The definition of diatonic can be as simple as '*music that remains within the confines of a single key*'. Diatonic harmony is based on the western world's major scale, and it is this scale that is the focus of the following essay.

### Intervals

An interval is the distance between any two notes. All scales and chords can be described using intervals. Intervals can be broken down to the amount of tones and semi-tones they consist of. In guitar-world, a semi-tone indicates an interval of one fret. A tone indicates an interval of two frets.

The common names given to the basic intervals are as follows:

<i>Interval distance</i>	<i>Interval name</i>	<i>Distance in frets</i>
1 semi-tone	Minor 2 <sup>nd</sup> (aka b2 <sup>nd</sup> )	1
1 tone	Major 2 <sup>nd</sup> (aka 2 <sup>nd</sup> )	2
1 ½ tones	Minor 3 <sup>rd</sup> (aka b3 <sup>rd</sup> )	3
2 tones	Major 3 <sup>rd</sup> (aka 3 <sup>rd</sup> )	4
2 ½ tones	Perfect 4 <sup>th</sup> (aka 4 <sup>th</sup> )	5
3 tones	Diminished 5 <sup>th</sup> (aka b5 <sup>th</sup> )	6
3 ½ tones	Perfect 5 <sup>th</sup> (aka 5 <sup>th</sup> )	7
4 tones	Minor 6 <sup>th</sup> (aka b6 <sup>th</sup> )	8
4 ½ tones	Major 6 <sup>th</sup> (aka 6 <sup>th</sup> )	9
5 tones	Minor 7 <sup>th</sup> (aka b7 <sup>th</sup> )	10
5 ½ tones	Major 7 <sup>th</sup> (aka 7 <sup>th</sup> )	11
6 tones	Octave	12

### *Examples:*

The interval between the notes D and E is a major 2<sup>nd</sup>. This can be heard by taking the note on the open D string (the D), and moving up 2 frets (a tone) to the E on the same string.

The interval between the notes E and G is a minor 3<sup>rd</sup>. This can be heard by taking the note on the open E string (the E), and moving up 3 frets to the G on the same string.

The interval between the notes A and G is a minor 7<sup>th</sup>. This can be heard by taking the note on the open A string (the A), and moving up 10 frets to the G on the same string and the 10<sup>th</sup> fret.

The interval between the notes F and A is a major 3<sup>rd</sup>. This can be heard by taking the note at the 1<sup>st</sup> fret on the E string (the F), and moving it up 4 frets to the A on the same string.

## Chromatic Scale

The chromatic scale contains every note in the western world's musical alphabet. In guitar-terms, it's what you get when you play 12 notes in a row, with a single fret distance between each note.

If we take the note of 'C' as the starting note for the chromatic scale, you get the following sequence of notes (identical notes with two possible names have the second name shown in brackets):

C – C# (Db) - D – D# (Eb) – E – F – F# (Gb) - G – G# (Ab) - A – A# (Bb) – B

Because every possible note is used in the chromatic scale, it doesn't sound particularly melodic, nor does it sound like it belongs to a particular key as all the notes in it are effectively equal. If we chose the note of G as our starting point for the chromatic scale, we'd end up with the same notes as above, only with a different start and end point:

G – G# (Ab) - A – A# (Bb) – B - C – C# (Db) - D – D# (Eb) – E – F – F# (Gb)

Each note in the chromatic scale can be assigned as interval from the starting note (the root note), in the way that we saw when looking at intervals, above:

<i>Note</i>	C	C#	D	D#	E	F	F#	G	G#	A	A#	B
<i>Interval</i>	Root	b2 <sup>nd</sup>	2 <sup>nd</sup>	b3 <sup>rd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	b5 <sup>th</sup>	5 <sup>th</sup>	b6 <sup>th</sup>	6 <sup>th</sup>	b7 <sup>th</sup>	7 <sup>th</sup>

It may help to think of the chromatic scale as a paint palette with every possible colour in it. If you used them all, all of the time, you'd have a strange looking painting. Stronger, more melodic sounds are introduced when notes (and therefore intervals) are left out of the chromatic scale to create other scales. The most important scale to understand is the major scale.

Note: In the musical alphabet that forms the chromatic scale, there is only a semi-tone distance between B and C, and between E and F.

## Major Scale

The major scale is a 7 note scale, as opposed to the 12 note chromatic scale. This means that 5 notes from the chromatic scale are dropped to form any given major scale. The major scale has the following formula of intervals:

$$\text{Root} - 2^{\text{nd}} - 3^{\text{rd}} - 4^{\text{th}} - 5^{\text{th}} - 6^{\text{th}} - 7^{\text{th}}$$

From the chromatic scale, we're losing the intervals  $b2^{\text{nd}}$ ,  $b3^{\text{rd}}$ ,  $b5^{\text{th}}$ ,  $b6^{\text{th}}$ ,  $b7^{\text{th}}$

The intervals between the notes in the major scale can be as follows:

$$\text{Tone} - \text{Tone} - \text{Semitone} - \text{Tone} - \text{Tone} - \text{Tone} - \text{Semitone}$$

This set of intervals is the same for whatever root note we start from. The actual notes that form a given major scale change depending on the root note of the scale.

If we look at the chromatic scale with a root (aka tonic) of C, we get the following:

Note	C	C#	D	D#	E	F	F#	G	G#	A	A#	B
Interval	Root	b2	2	b3	3	4	b5	5	b6	6	b7	7

If we then take out the intervals that are not in the major scale, in the key of C we're left with the following:

Note	C		D		E	F		G		A		B
Interval	Root		2		3	4		5		6		7

As shown above, the notes of the major scale in the key of C are (starting from the root note) C – D – E – F – G – A – B.

If we now look at how to derive the major scale in the key of G, you'll see that the scale formula is the same, but the notes used change. The chromatic scale, starting from the note of G, gives the following:

Note	G	G#	A	A#	B	C	C#	D	D#	E	F	F#
Interval	Root	b2	2	b3	3	4	b5	5	b6	6	b7	7

If we now leave behind only the intervals that form the major scale, in the key of G we're left with the following:

Note	G		A		B	C		D		E		F#
Interval	Root		2		3	4		5		6		7

As you can see, the G major scale consists of the notes G – A – B – C – D – E – F#.

Finally, we'll now derive the notes for the E major scale. The chromatic scale, starting from the note of E, gives the following:

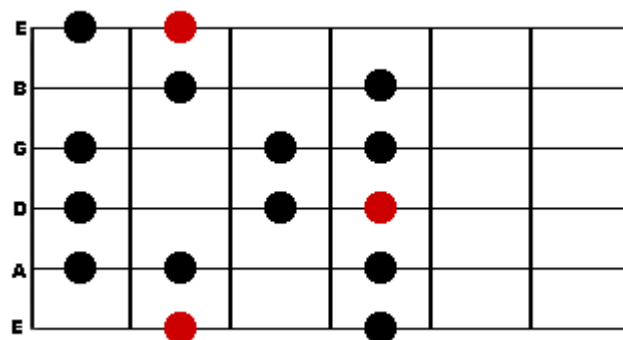
<i>Note</i>	E	F	F#	G	G#	A	A#	B	C	C#	D	D#
<i>Interval</i>	Root	b2	2	b3	3	4	b5	5	b6	6	b7	7

By now leaving only the intervals the form the major scale, with a root note of E we're left with the following notes that make up the E major scale:

<i>Note</i>	E		F#		G#	A		B		C#		D#
<i>Interval</i>	Root		2		3	4		5		6		7

A solid understanding of the major scale and how it is derived for a given key (aka root/tonic) is crucial, as it then allows us to explore which chords belong in which key. This is the basis of the diatonic system, and is the next section to cover.

The image below shows a possible fingering on guitar for the F# major scale (starting with the F# note on the 2<sup>nd</sup> fret of the low E string):



This shape is a moveable shape, meaning that by moving each note up a fret, you'd have the G Major scale. Moving everything up by 3 frets would give you the A major scale.

## Diatonic Triads

A triad is a chord containing three distinct notes. The following major and minor chords are triads, for example:

A major: x-0-2-2-2-0  
B major: x-2-4-4-4-2  
B minor: x-2-4-4-3-2  
C major: x-3-2-0-1-0  
D major: x-x-0-2-3-2  
D minor: x-x-0-2-3-1  
E major: 0-2-2-1-0-0  
F major: 1-3-3-2-1-1  
G major: 3-2-0-0-3-3

All of the above chords, despite being played across 4, 5, or 6 strings, only actually contain 3 distinct notes. As such, they are all classed as either major or minor triads.

Major triad chords are built using the root, the major 3<sup>rd</sup>, and the 5<sup>th</sup> intervals from the given root note.

Minor chords are built using the root, the minor 3<sup>rd</sup>, and the 5<sup>th</sup> intervals from the given root note. (There is also one diatonic diminished chord, which is like a minor chord, but with a b5<sup>th</sup> instead of a 5<sup>th</sup> – this is explained later).

As we saw above, for a given key (or root note/tonic) we can derive the notes that form the major scale for that key. Each note in the major scale can be referred to as a **degree**, and we can build a diatonic triad chord starting from each degree of the scale. This process is called **harmonizing the major scale**. By harmonising the 7 note major scale, we can build 7 diatonic triads.

*Diatonic triads are the chords derived from each degree of a given major scale.*

By harmonizing the major scale to derive the diatonic triad chords, we are given a set of chords that naturally sound pleasant together – enabling composers to create chord progressions that are more pleasing to the ear than if using non-diatonic chords.

Let's take the major scale for the key of C, which as we saw above, contains the notes C, D, E, F, G, A, and B. If each degree of this scale has a triad that can be built from it, we can deduce that the 7 note major scale produces 7 triad chords which belong to that key.

We derive the triad for each scale degree by taking each degree in turn, and then 'stacking thirds' above it. Look at the example below, where all intervals shown are the interval between the root of the chord, and the note in question:

Scale Note	C	D	E	F	G	A	B
<b>Triad</b>							
<b>C major</b>	<i>Root</i>		3 <sup>rd</sup>		5 <sup>th</sup>		
<b>D minor</b>		<i>Root</i>		b3 <sup>rd</sup>		5 <sup>th</sup>	
<b>E minor</b>			<i>Root</i>		b3 <sup>rd</sup>		5 <sup>th</sup>
<b>F major</b>	5 <sup>th</sup>			<i>Root</i>		3 <sup>rd</sup>	
<b>G major</b>		5 <sup>th</sup>			<i>Root</i>		3 <sup>rd</sup>
<b>A minor</b>	b3 <sup>rd</sup>		5 <sup>th</sup>			<i>Root</i>	
<b>B dim</b>		b3 <sup>rd</sup>		b5 <sup>th</sup>			<i>Root</i>

If we examine each derived chord in turn, we can see how we arrived at that that set of chords by stacking the thirds (remember that a triad with a minor third, relative to the root, is a minor chord, and a triad with a major third, relative to the root, is a major chord):

*C major*: formed by taking the root note (C), the scale degree a 3<sup>rd</sup> above it (E) and the scale degree a 3<sup>rd</sup> above that note (G). Because the E note is a major 3<sup>rd</sup> above C, we get a major triad.

*D minor*: formed by taking the root note (D), the scale degree a 3<sup>rd</sup> above it (F) and the scale degree a 3<sup>rd</sup> above that note (A). Because the F note is a minor 3<sup>rd</sup> above D, we get a minor triad.

*E minor*: formed by taking the root note (E), the scale degree a 3<sup>rd</sup> above it (G) and the scale degree a 3<sup>rd</sup> above that note (B). Because the G note is a minor 3<sup>rd</sup> above E, we get a minor triad.

*F major*: formed by taking the root note (F), the scale degree a 3<sup>rd</sup> above it (A) and the scale degree a 3<sup>rd</sup> above that note (C). Because the A note is a major 3<sup>rd</sup> above F, we get a major triad.

*G major*: formed by taking the root note (G), the scale degree a 3<sup>rd</sup> above it (B) and the scale degree a 3<sup>rd</sup> above that note (D). Because the B note is a major 3<sup>rd</sup> above G, we get a major triad.

*A minor*: formed by taking the root note (A), the scale degree a 3<sup>rd</sup> above it (C) and the scale degree a 3<sup>rd</sup> above that note (E). Because the C note is a minor 3<sup>rd</sup> above A, we get a minor triad.

*B diminished*: formed by taking the root note (B), the scale degree a 3<sup>rd</sup> above it (D) and the scale degree a 3<sup>rd</sup> above that note (F). Because the D note is a minor 3<sup>rd</sup> above B, and because the F note is actually a b5<sup>th</sup> above B, we get a minor triad with a b5<sup>th</sup>, which is diminished.

(Note: some of the chords in the table loop around the table – so when we hit the final column - ‘B’ in this case - the next note in the scale is ‘C’, then ‘D’, then ‘E’ etc...)

This pattern of major and minor chords is the same, relative to the root of the key, regardless of which key we’re in. As with the major scale, where the pattern of intervals is the same and it’s the notes that change with the keys, the pattern of triads

built from a major scale remains the same, but the chord names change to reflect the different notes in the scale.

The pattern of triads for a given major scale will always be:

*Major – Minor – Minor – Major – Major – Minor - Diminished*

If we use the notes of the E major scale (E – F# - G# - A – B – C# - D#) to derive the diatonic triads for the key of E, we end up with the following set:

<u>Scale Note</u>	E	F#	G#	A	B	C#	D#
<b>Triad</b>							
<b>E major</b>	<i>Root</i>		3 <sup>rd</sup>		5 <sup>th</sup>		
<b>F# minor</b>		<i>Root</i>		b3 <sup>rd</sup>		5 <sup>th</sup>	
<b>G# minor</b>			<i>Root</i>		b3 <sup>rd</sup>		5 <sup>th</sup>
<b>A major</b>	5 <sup>th</sup>			<i>Root</i>		3 <sup>rd</sup>	
<b>B major</b>		5 <sup>th</sup>			<i>Root</i>		3 <sup>rd</sup>
<b>C# minor</b>	b3 <sup>rd</sup>		5 <sup>th</sup>			<i>Root</i>	
<b>D# dim</b>		b3 <sup>rd</sup>		b5 <sup>th</sup>			<i>Root</i>

So the chords in the key of E major are E major, F# minor, G# minor, A major, B major, C# minor, and D# diminished. Notice that the same pattern of major/minor/minor/major/major/minor/diminished applies.

Finally, let's look at the triad chords derived from the key of G major:

<u>Scale Note</u>	G	A	B	C	D	E	F#
<b>Triad</b>							
<b>G major</b>	<i>Root</i>		3 <sup>rd</sup>		5 <sup>th</sup>		
<b>A minor</b>		<i>Root</i>		b3 <sup>rd</sup>		5 <sup>th</sup>	
<b>B minor</b>			<i>Root</i>		b3 <sup>rd</sup>		5 <sup>th</sup>
<b>C major</b>	5 <sup>th</sup>			<i>Root</i>		3 <sup>rd</sup>	
<b>D major</b>		5 <sup>th</sup>			<i>Root</i>		3 <sup>rd</sup>
<b>E minor</b>	b3 <sup>rd</sup>		5 <sup>th</sup>			<i>Root</i>	
<b>F# dim</b>		b3 <sup>rd</sup>		b5 <sup>th</sup>			<i>Root</i>

As you can see, this gives us the following chords, in the key of G major:

G major, A minor, B minor, C major, D major, E minor, and F# diminished.

## Relative Minor

All major keys have a relative minor key that shares the same notes, and therefore the same derived triad chords.

To find the relative minor for a given major key, simply take the 6<sup>th</sup> degree of the major scale, and that note represents the relative minor key.

For example, in the key of C, we have the following major scale and derived diatonic triads:

Scale degree	Root	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>	6 <sup>th</sup>	7 <sup>th</sup>
<b>C major note</b>	C	D	E	F	G	A	B
<b>Triad</b>	C maj	D min	E min	F maj	G maj	A min	B dim

The 6<sup>th</sup> degree of the C major scale is A. This gives us A minor as the relative minor key of C major, meaning that all the chords in the key of C major also belong in the key of A minor.

As another example, in the key of E major, we get the following major scale and derived diatonic triads:

Scale degree	Root	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>	6 <sup>th</sup>	7 <sup>th</sup>
<b>E major note</b>	E	F#	G#	A	B	C#	D#
<b>Triad</b>	E maj	F# min	G# min	A maj	B maj	C# min	D# dim

The 6<sup>th</sup> degree of the E major scale is C#, so this gives us C# minor as the relative minor key of E major.

The relative minor principle can also be used to determine the reverse route, i.e. what is the relative major chord of a given minor chord?

To work this out, take the minor chord in question, and move up to a major chord that is a tone and a half (i.e. 3 frets) higher. This is the relative major chord. For example, if the minor chord is B minor, moving up 3 frets gives you a root note of D, and B minor is the relative minor of D major.

To use the examples above, if you take the root note of A minor and move it up a tone and a half, you get to C major. Likewise, moving the root note of C# minor up a tone and a half gives you the relative major chord of E major.

## 7th Chords

In the same way that a set of triad chords can be derived from a given major scale, we can also derive a set of 7<sup>th</sup> chords that build upon the basic triads. As discussed earlier, a triad chord only ever contains three distinct notes, and harmonizing the major scale gives us three types of triad:

Major triad = Root – 3<sup>rd</sup> – 5<sup>th</sup>

Minor triad = Root – b3<sup>rd</sup> – 5<sup>th</sup>

Diminished triad = Root – b3<sup>rd</sup> – b5<sup>th</sup>

7<sup>th</sup> chords are built in exactly the same way as triads, but they have an extra note added to them, achieved by stacking a further third on top of the last note in a triad.

If we take the key of C major, and stack four 3<sup>rd</sup>s on top of each other for each note in the scale, we arrive at the following set of 7<sup>th</sup> chords:

Scale Note	C	D	E	F	G	A	B
<b>Triad</b>							
<b>C major 7</b>	Root		3 <sup>rd</sup>		5 <sup>th</sup>		7 <sup>th</sup>
<b>D minor 7</b>	b7 <sup>th</sup>	Root		b3 <sup>rd</sup>		5 <sup>th</sup>	
<b>E minor 7</b>		b7 <sup>th</sup>	Root		B3 <sup>rd</sup>		5 <sup>th</sup>
<b>F major 7</b>	5 <sup>th</sup>		7 <sup>th</sup>	Root		3 <sup>rd</sup>	
<b>G dominant 7</b>		5 <sup>th</sup>		b7 <sup>th</sup>	Root		3 <sup>rd</sup>
<b>A minor 7</b>	b3 <sup>rd</sup>		5 <sup>th</sup>		b7 <sup>th</sup>	Root	
<b>B min7b5</b>		b3 <sup>rd</sup>		b5 <sup>th</sup>		b7 <sup>th</sup>	Root

As the table shows, there are four types of 7<sup>th</sup> chords that are derived when we harmonize the major scale to get 7<sup>th</sup> chords, and these have the following chord names and associated formulas:

Major 7<sup>th</sup> = Root – 3<sup>rd</sup> – 5<sup>th</sup> – 7<sup>th</sup>

Minor 7<sup>th</sup> = Root – b3<sup>rd</sup> – 5<sup>th</sup> – b7<sup>th</sup>

Dominant 7<sup>th</sup> = Root – 3<sup>rd</sup> – 5<sup>th</sup> – b7<sup>th</sup>

Minor 7<sup>th</sup> b5<sup>th</sup> = Root – b3<sup>rd</sup> – b5<sup>th</sup> – b7<sup>th</sup>

In the key of C major, this gives us the following chords:

*Cmaj7*: This is a C major triad with an added B note, which is a 7<sup>th</sup> above the C.

*Dmin7*: This is a D minor triad with an added C note, which is a b7<sup>th</sup> above the D.

*Emin7*: This is an E minor triad with an added D note, which is a b7<sup>th</sup> above the E.

*Fmaj7*: This is a F major triad with an added E note, which is a 7<sup>th</sup> above the F.

*Gdom7*: This is a G major triad with an added F note, which is a b7<sup>th</sup> above the G.

*Amin7*: This is an A minor triad with an added G note, which is a b7<sup>th</sup> above the A.

*Bm7b5*: This is a B minor b5<sup>th</sup> triad with an added A note, which is a b7<sup>th</sup> above the B

Once again, this pattern of chords is the same regardless of what key we're in, so you always end up with the pattern when harmonizing a major scale for 7<sup>th</sup> chords:

*Major 7 – Minor 7 – Minor 7 – Major 7 – Dominant 7 – Minor 7 – Minor7b5*

As seen above, as well as producing two *major 7<sup>th</sup>* chord and three *minor 7<sup>th</sup>* chords, harmonizing the major scale into 7<sup>th</sup> chords produces another type of chord: the *dominant chord*.

A dominant chord is any major chord (therefore containing a major 3<sup>rd</sup> interval) that also contains a b7<sup>th</sup> interval. Dominant chords are commonly written as either Cdom7, or more often simply C7. The difference between a major 7 chord and a dominant 7 chord is that the former contains a major 3<sup>rd</sup> and a major 7<sup>th</sup> (and is written Cmaj7), while the latter contains the major 3<sup>rd</sup> and the b7<sup>th</sup> (and is written C7).

Harmonizing the major scale as shown above will produce one dominant chord, and this will always be found on the fifth note of the major scale. As the example above shows, the key of C major produces a G dominant chord (G7), as G is the fifth note of the C major scale.

Earlier examples can be re-interpreted to show how the key of G major produces a dominant chord on the 5<sup>th</sup> degree of D7, while the key of E major produces a dominant chord on the 5<sup>th</sup> degree of B7.

The inclusion of the b7<sup>th</sup> note in the dominant chord gives it a distinct sound that is different from the major 7<sup>th</sup> chord. The dominant chord creates a tension that lends itself to resolution back to the tonic (root) chord of the scale. Using the examples above, this can be heard by playing G7 followed by Cmaj7 (in the key of C), D7 followed by Gmaj7 (in the key of G), and B7 followed by Emaj7 (in the key of E).

To summarize the section on deriving 7<sup>th</sup> chords, we can take a look at some common fingerings for playing them. One possible set of fingering for the 7<sup>th</sup> chords derived from harmonizing the C major scale is shown below (with the root notes played on the 5<sup>th</sup> string):

*Cmaj7* = x-3-5-4-5-3  
*Dmin7* = x-5-7-5-6-5  
*Emin7* = x-7-9-7-8-7  
*Fmaj7* = x-8-10-9-10-8  
*G7* = x-10-12-10-12-10  
*Amin7* = x-0-2-0-1-0  
*Bm7b5* = x-2-3-2-3-x

Another set of fingerings are shown here, with the root notes played on the 6<sup>th</sup> string:

*Cmaj7* = 8-10-9-9-8-8  
*Dmin7* = 10-12-10-10-10-10  
*Emin7* = 12-14-12-12-12-12  
*Fmaj7* = 1-3-2-2-1-1  
*G7* = 3-5-3-4-3-3  
*Amin7* = 5-7-5-5-5-5  
*Bm7b5* = 7-8-7-7-x-x

## Extended Chords

Extended chords refer to chords that contain notes from the next octave above the root, and commonly have names such as Cmaj9, C11, and Cmin13 etc.

If we take the C major scale over two octaves, we get the following notes:

Degree	R	2	3	4	5	6	7	8	9	10	11	12	13	14
Note	C	D	E	F	G	A	B	C	D	E	F	G	A	B

As the table shows, when the first octave completes (at the 8<sup>th</sup> degree when the C repeats) the major scale simply starts again with the same notes.

The 3<sup>rd</sup>, 5<sup>th</sup> and 7<sup>th</sup> degrees are not classed as extensions to chords when they're added in from the upper octave, as they are assumed to be present from the first octave. As a result, chords will not have the 10<sup>th</sup> (the 3<sup>rd</sup> an octave higher), 12<sup>th</sup> (the 5<sup>th</sup> an octave higher) or 14<sup>th</sup> (the 7<sup>th</sup> an octave higher) added to their names.

The 2<sup>nd</sup>, 4<sup>th</sup>, and 6<sup>th</sup> degrees, when added to a chord, tend to use their upper-octave name, and thus become the 9<sup>th</sup> (the 2<sup>nd</sup> and octave higher), 11<sup>th</sup> (the 4<sup>th</sup> an octave higher) and 13<sup>th</sup> (the 6<sup>th</sup> an octave higher). As a result of this, the only extended chords we tend to see named are when either the 9<sup>th</sup>, 11<sup>th</sup> or 13<sup>th</sup> have been added to a chord.

The name of the chord is determined by two factors: the highest interval used, and whether the chord is major, minor, or dominant.

Examples (all in the key of C major):

R – 3 – 5 – 7 – 9 = Cmaj9

R – 3 – 5- b7 – 9 = C9

R – b3 – 5 – b7 – 9 = Cmin9

R – 3 – 5 – 7 – 9 - 11 = Cmaj11

R – 3 – 5- b7 – 9 - 11 = C11

R – b3 – 5 – b7 – 9 – 11 = Cmin11

R – 3 – 5 – 7 – 9 – 11 - 13 = Cmaj13

R – 3 – 5- b7 – 9 – 11 - 13 = C13

R – b3 – 5 – b7 – 9 – 11 – 13 = Cmin13

Not all of the (lower) extensions need to be included in an extended chord. For example, a Cmaj13 chord can contain the 9<sup>th</sup>, 11<sup>th</sup> and 13<sup>th</sup> extensions; however it only needs to contain the 13<sup>th</sup> (the fact that the 13<sup>th</sup> chords can contain 7 notes should indicate that not all the extensions need to be played). Likewise, a C11 chord doesn't have to contain the 9<sup>th</sup> degree.

If the extended chord does not contain the 7<sup>th</sup> (in the case of major chords) or the b7<sup>th</sup> (in the case of minor chords), adding extensions creates what are known as 'add' chords.

For example, the following chords are ‘add’ chords as they do not contain either the 7<sup>th</sup> or the b7<sup>th</sup> degrees of the major scale:

R-3-5-9 = Cadd9

R-b3-5-9 = C minor add9

R-3-5-11 = Cadd11

R-b3-5-11 = C minor add11

R-3-5-13 = Cadd13

R-b3-5-13 = C minor add13

When adding extensions to chords, *the extensions are derived from the major scale of the chord in question*. For example, Cmaj13 contains the 13<sup>th</sup> degree from the C major scale, while Gmaj13 contains the 13<sup>th</sup> degree from the G major scale, and Emaj11 contains the 11<sup>th</sup> degree from the E major scale. The following tables show how these chords are derived from the major scale of the chord’s root note.

*Cmaj13, derived from the C major scale:*

<b>Degree</b>	R	2	3	4	5	6	7	8	9	10	11	12	13	14
<b>Scale</b>	C	D	E	F	G	A	B	C	D	E	F	G	A	B
<b>Chord</b>	C		E		G		B						A	

Therefore the chord Cmaj13 contains the notes C, E, G, B and A. It could also contain the optional extensions D (the 9<sup>th</sup>) and F (the 11<sup>th</sup>)

*Gmaj13, derived from the G major scale:*

<b>Degree</b>	R	2	3	4	5	6	7	8	9	10	11	12	13	14
<b>Scale</b>	G	A	B	C	D	E	F#	G	A	B	C	D	E	F#
<b>Chord</b>	G		B		D		F#						E	

Therefore the chord Gmaj13 contains the notes G, B, D, F# and E. It could also contain the optional extensions A (the 9<sup>th</sup>) and C (the 11<sup>th</sup>)

*Emaj11, derived from the E major scale:*

<b>Degree</b>	R	2	3	4	5	6	7	8	9	10	11	12	13	14
<b>Scale</b>	E	F#	G#	A	B	C#	D#	E	F#	G#	A	B	C#	D#
<b>Chord</b>	E		G#		B		D#				A			

Therefore the chord Emaj11 contains the notes E, G#, B, D# and A. It could also contain the optional extension F# (the 9<sup>th</sup>).

Minor chords can be derived in the same way as the above major chords but by flattening the 3<sup>rd</sup> and 7<sup>th</sup> degrees of the chord.

Dominant chords can be derived in the same way as the above major chords but by flattening the 7<sup>th</sup> degree of the chord.