

9. Musical Chords

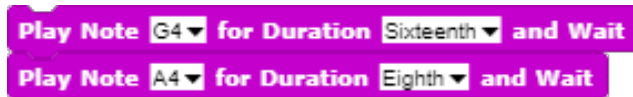
Glen Bull, Jo Watts, Rachel Gibson, and Luke Dahl

The melody of a song consists of a sequential series of musical notes played one after another. A musical chord consists of several notes played together. A repeated progression of chords often is used as a backing track that repeats as the melody is played over it. This pattern, known as a chord progression, creates a sense of movement.

Some instruments, such as the piano, allow the musician playing it to play chords with one hand and melody with another. With other instruments, such as the guitar, it can be difficult to play both chords and melody at the same time. Therefore, many bands employ two guitarists, one to play chords and another to play melodies. Other instruments, like brass and woodwinds, are physically incapable of playing more than one note at a time, making playing chords on these instruments impossible. A computer can be programmed to play chords and melodies, including ones that would not be possible on a physical instrument.

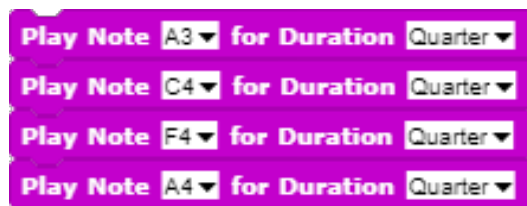
Topic 9.1 Parallel and Sequential Notes

The **Play Note and Wait** block waits until one note ends before beginning the next.



In the illustration above, the note G4 is played for one-sixteenth of a beat, followed by A4 for an eighth of a beat. On a piano, the first key would be struck, and then musician would then wait for one-sixteenth of a beat before striking the next piano key.

In contrast, a chord consists of several notes played together at the same time. The **Play Note** code block does not wait until one note ends before beginning the next note.



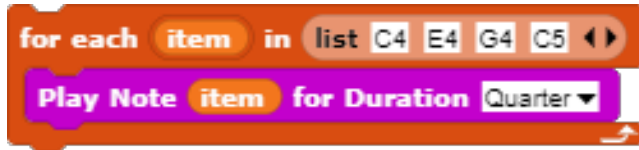
On a piano, the musician would strike all four piano keys corresponding to the notes A3, C3, F3, and A4 at the same time. In previous modules, notes that sound good in combination with another were identified. These notes are often combined into subgroups within the twelve-note chromatic scale, forming subsets of the chromatic scales such as the major scales and the pentatonic scales. Combinations of notes that sound pleasing when played together are also often combined to form chords.

Exploration 9.1 Play Notes

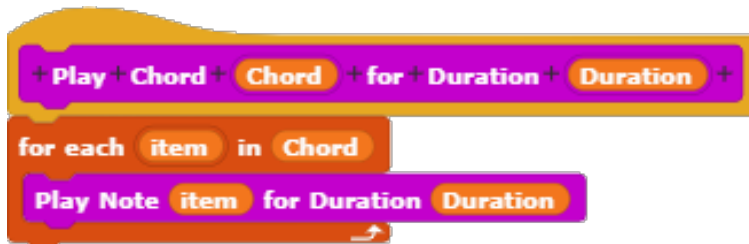
Use the **Play Note** code block to create combinations of notes that sound pleasing. Identify two or three combinations of notes that could be used to form chords.

Topic 9.2 Play Chord Block

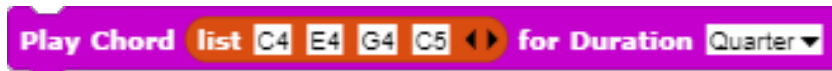
In a previous module, the **Play Motif** block was developed to play a sequence of notes in a list. This same method can be adapted to play a chord by replacing **Play Note and Wait** with **Play Note**.



This method can be used as the basis for a **Play Chord** block.



The list of notes that form the chord are provided as an input to the **Play Chord** code block and play the chord for the duration specified.



The **Play Chord** block should wait until the chord is completed before continuing to the next chord. This can be accomplished by adding a **Rest** block at the end of the procedure.

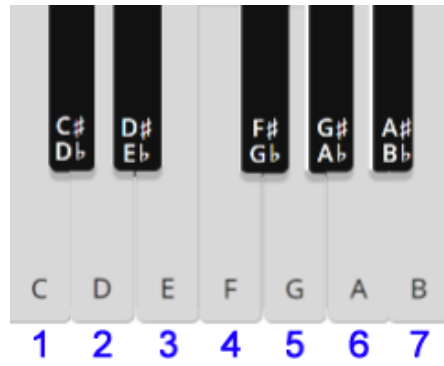


Exploration 9.2 Play Chord Block

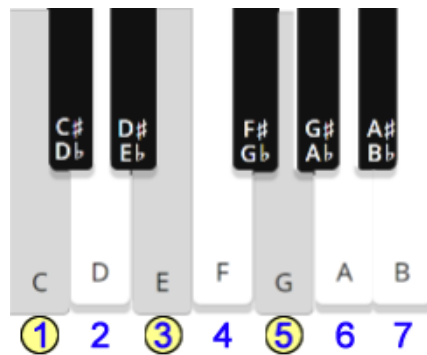
Identify a sequence of notes that sounds pleasing when played in combination to form a chord.

Topic 9.3 Major Chords

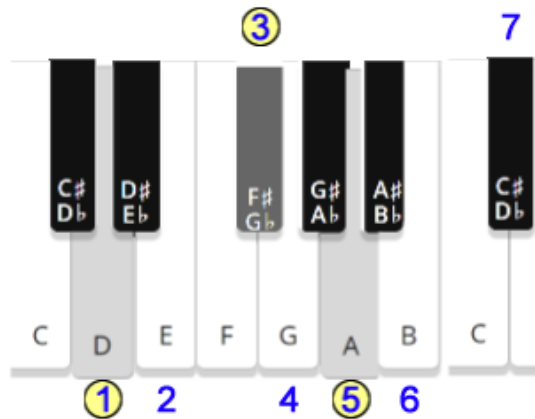
The previous module (*Musical Notes and Scales*) introduced the major and minor scales. These scales are seven-note subsets of the full twelve-note chromatic scale. Major chords are three-note combinations of notes within a seven-note major scale. For example, the C Major scale consists of the seven white keys, numbered one through seven in the illustration below.



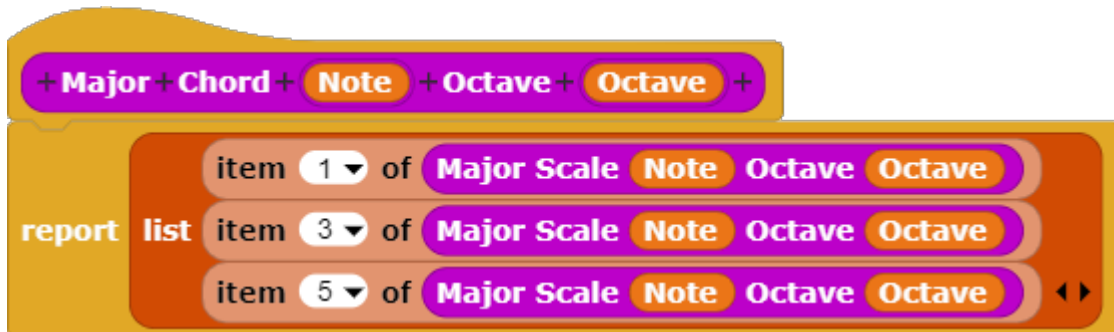
The C Major chord consists of the first, third, and fifth notes of the C Major scale (i.e., the notes C, E, and G).



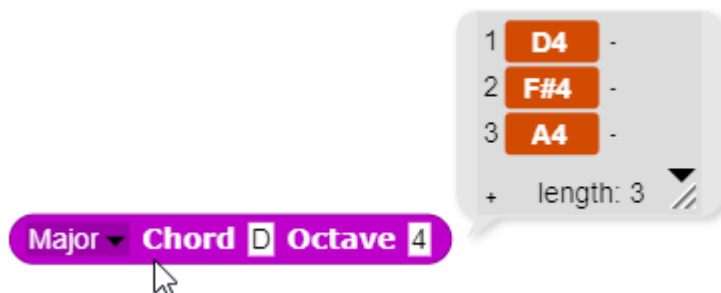
This pattern is repeated for all of the other major scales. For example, the D Major chord is composed of the first, third, and fifth notes of the D Major scale (i.e., the notes D, F#, and A).



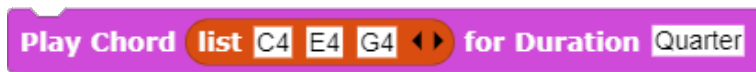
A block that reports the major chord for any major scale simply reports the first, third, and fifth items of that scale.



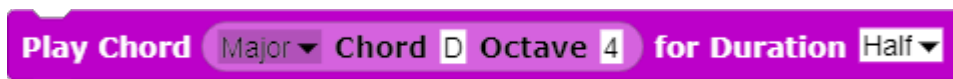
For example, the D Major chord consists of D, F#, and A. In the example below, the fourth octave has been specified for this chord.



The **Play Chord** code block plays a group of notes that form a chord.



The **Major Chord** reporter block can now be used in combination with the **Play Chord** code block to play any of the twelve major chords in any octave.

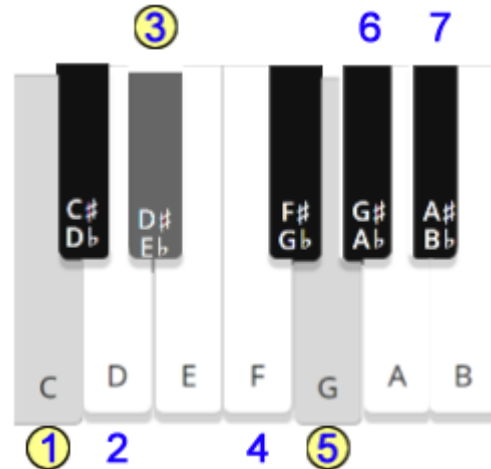


Exploration 9.3 Major Chords

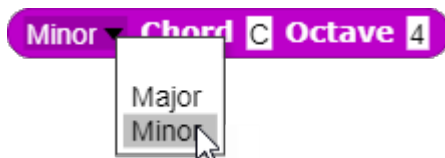
Try combining the note C from one octave with the notes E and G from different octaves. How does that affect the quality of the chord produced? Try assembling several sequences of chords. For example, try combining a C Major chord, followed by a F Major chord, followed by a G Major chord. What other sequences of chords sound good in combination with one another?

Topic 9.4 Minor Chords

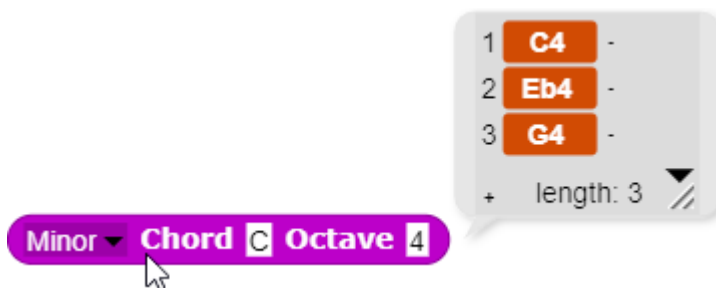
Minor chords are formed from notes that are a subset of the notes of a minor scale. For example, in the case of the C Minor scale, the first, third, and fifth notes form a C Minor chord (that is, the notes C, Eb, and G).



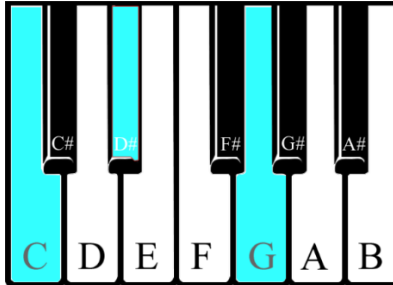
An extension of the **Major Chord** reporter block includes an option to select either the major or the minor chords.



For example, in the case of the C Minor scale, the notes C, Eb, and G form the C Minor chord.



On a piano keyboard, this chord consists of the combination of keys shown in the illustration below. The shift from a C Major chord to a C Minor chord involves replacement of the note E with the note below it in the scale. This causes the minor chord to be perceived as more dissonant because the ratios formed are higher.



Exploration 9.4 Minor Chords

Assemble several sequences of chords that include both major and minor chords. For example, try combining a C Major chord, followed by an A Minor chord, followed by a F Major chord, followed by a G Major. What other combinations of major and minor chords might sound good?

Topic 9.5 Four-note Chords

A total of 24 chords – 12 major chords and 12 minor chords – have been described thus far. These chords, major and minor, form the foundation for other chords.

The foundational chords contain three notes. Four-note chords are also common. Addition of a fourth note changes the way that the chord sounds. Some chords can contain as many as ten different notes, but these rare chords are typically only found in experimental forms of classical and jazz music.

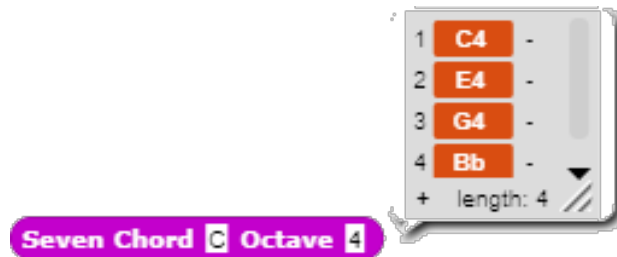
For example, the seventh note of a minor scale is often added to a major chord to create dissonance in genres such as the blues. For example, a C Major chord consists of the notes C, E, and G. The seventh note of the C Minor scale is Bb.



The **Append** block can be used to append the seventh note in the C Minor scale to a C Major chord.



Because this type of chord is formed by adding the seventh note of a minor scale to a major chord, it is often referred to as a *Seven Chord*. A **Seven Chord** code block can now be made to combine a major chord with the seventh note of the corresponding minor scale to form a Seven Chord.



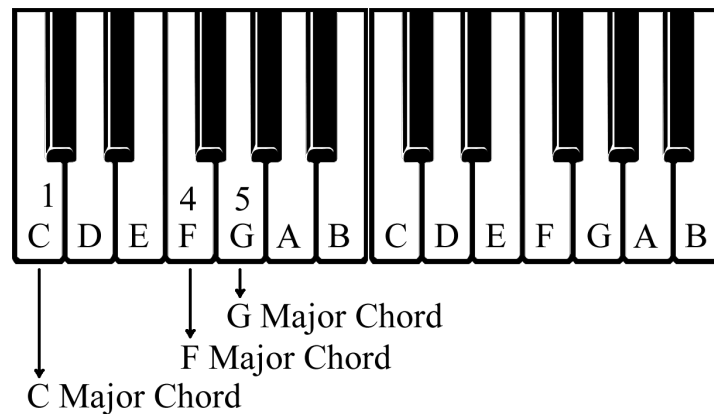
Other methods of forming *Seven Chords* can be found in the *Appendix*. Another common way of creating four-note chords is to repeat the two notes of the chord in a different octave. For example, the notes C4 and G4 might be repeated in the fifth octave to create the chord combination C4, G4, C5, G5.

Exploration 9.5 Four-Note Chords

Create several four-note chords. Add a note from a minor scale to a major chord to create a four-note chord. For example, try combining G, B, D (from the G Major scale) with F (from the G Minor scale). Try creating chords that double the first and second notes of the chord in a different octave. For example, try combining G4 and E4 with G5 and E5.

Topic 9.6 Chord Progressions in the Major Scale

A chord progression consists of a series of chords, often used as a backing track that accompanies a melody consisting of individual notes. A common chord progression consists of the chords associated with the first, fourth, and fifth note in a major scale.



For example, the notes C, F, and G are the first, fourth, and fifth notes in the C Major scale. Therefore, the C Major chord progression would consist of the C Major chord, the F Major chord, and the G Major chord.

Because a *Major Scale* chord progression is established by the first, fourth, and fifth notes in the scale, the corresponding chords are often referenced as the *I Chord*, the *IV Chord*, and the *V Chord*. Roman numerals are used to reference chords to differentiate chords from notes. The I-IV-V chord progression for the C Major scale is summarized in the table below.

Chord Numbers	I	IV	V
C Major Chord Progression	C Chord	F Chord	G Chord

A chord progression beginning with a D Major chord would consist of the D Major Chord, the G Major Chord, and the A Major chord. Since these chords maintain the same relative positions in the D Major scale, the chord numbers remain the same.

Chord Numbers	I	IV	V
D Major Chord Progression	D Chord	G Chord	A Chord

There are many other chord progressions, but the I-IV-V chord progression is the basis of much of the popular music that employs the Western chromatic scale.

The **Major / Minor Chord Position** block can be used to identify the chords along a major scale.

The screenshot shows a purple block with the following settings: Major (dropdown), Chord C (text input), Octave 4 (dropdown), and Chord Position IV (dropdown). A mouse cursor is pointing at the 'Chord C' input. A tooltip is visible, showing a list of notes: 1 F4, 2 A4, 3 C5, and a length of 3.

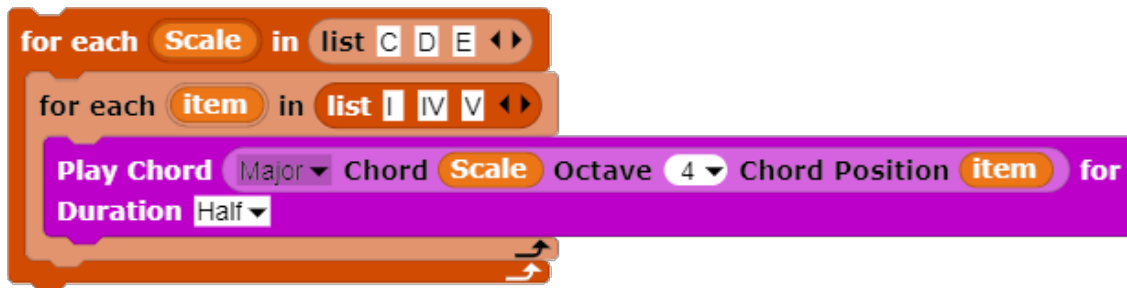
Chords can be described by using either the name of the chord (C Major chord) or the number of the chords (the I chord). Both chords consist of the same notes regardless of whether the name of the chord or the number of the chord is used.

The top screenshot shows the block with 'Chord C' and 'Octave 4'. The tooltip shows notes 1 C4, 2 E4, 3 G4, and a length of 3. The bottom screenshot shows the block with 'Chord C' and 'Octave 4'. The tooltip shows notes 1 C4, 2 E4, 3 G4, and a length of 3.

However, there is one advantage to referring to chords by number. A loop can be constructed to play a sequence of numbered chords.



Once code has been constructed that can play a progression of numbered chords, the chord progression can be readily shifted from one scale to another. The outer loop in the example below shifts from one scale to the next (C Major, D Major, E Major) and the inner loop plays a numbered chord sequence (I, IV, V) within each scale.



Because of this ease in shifting from one scale to another, musicians will sometimes refer to the “I Chord” or the “IV Chord”. Using this notation, the chords for the first verse of “Over the Rainbow” would be represented in the following way:

I iii IV I IV I vii ii vii i

Exploration 9.6 Chord Progressions in the Major Scale

Try experimenting with chord progressions composed of various major chords. For example, create a custom code block that plays a V-IV-I chord progression in any scale.

Topic 9.7 Chord Progressions in the Minor Scale

Minor chords are referenced with lower-case Roman numerals to distinguish them from major chords, which are referenced with upper-case Roman numerals.

A chord progression that begins in a minor scale often consists of two minor chords followed by a major chord. For example, a chord progression that begins with a C Minor chord would be followed by an F Minor chord succeeded by a G Major chord.

Chord Numbers	i	iv	V
C Minor Chord Progression	C Chord	F Chord	G Chord

Construction of a block that reports the notes associated with chords in the minor scale parallels the methods used to construct a similar code block for the major scale, except that the minor scales are used in creation of this reporter block.



This block, in turn, can be used to construct a custom minor chord progression block. This block parallels the major chord progression block, except that it uses the minor scale.

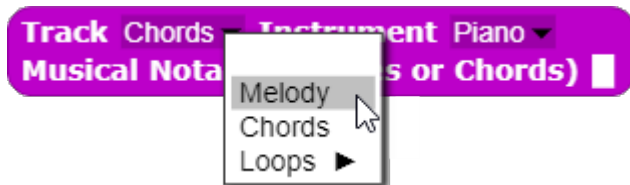
A blues chord progression can be formed by adding a fourth, minor chord to the end of the chord progression. While there are songs that follow a strict I-IV-V or i-iv-v chord progression, moving directly from one chord to the next before repeating the pattern, most songs that use those chords introduce more variation to the pattern. Some songs might add more chords to the sequence (e.g., I-IV-V-IV), while other songs might change the order completely (e.g., IV-V-I-I).

Exploration 9.7 Chord Progressions in the Minor Scale

Try experimenting with chord progressions composed of various major and minor chords. For example, try playing a chord progression consisting of G Major, D Major, and A Minor chords. Using the Roman numeral rotation, this can be written as I-V-ii.

Topic 9.8 Chord Tracks

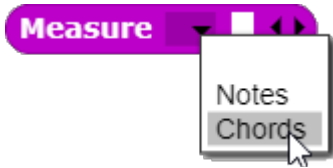
The **Play Tracks** block was introduced in previous modules. Thus far two types of music tracks have been introduced: melody tracks and drum tracks. The **Track** block can be used to create either a melody track (consisting of individual notes) or a chord track. Loops can be created for both melody and chord tracks; when a loop is created, the track loops until the main music track is completed.



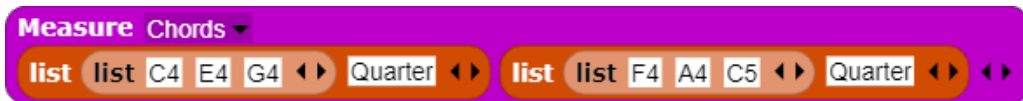
As noted above, the format for a chord consists of two or more notes and a duration.



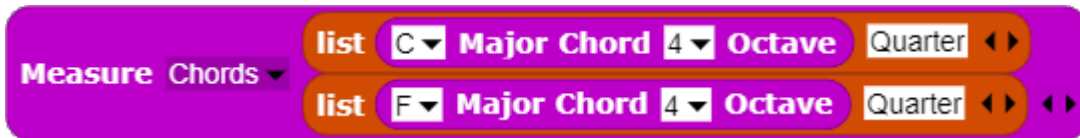
A series of chords formatted in this manner are then placed in a measure. In music, a measure is used to group notes together. In TuneScope, the **Measure** block is also used as a mechanism to ensure that the music remains synchronized across tracks. A drop-down menu can be used to select either notes or chords.



When the *Chords* option is selected, chords can be grouped together in the **Measure** block.



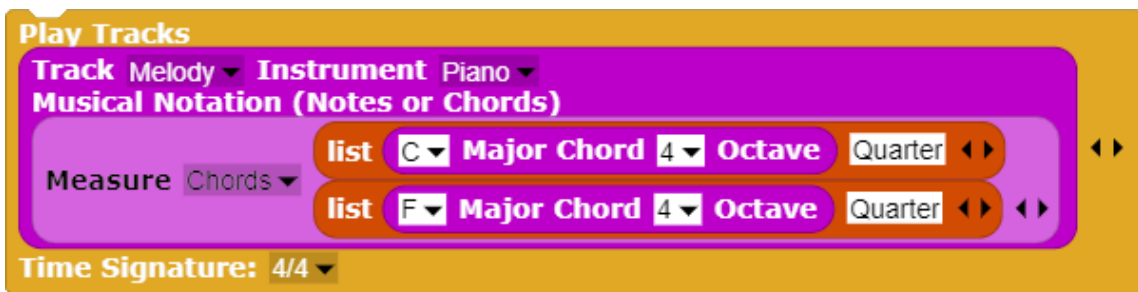
A **Chords** reporter block could also be used in place of individually listed notes (as shown above) since the two forms are functionally equivalent.



A list of chords formatted in this manner can then be placed in the input to a **Track** block (with the *Chords* option selected).



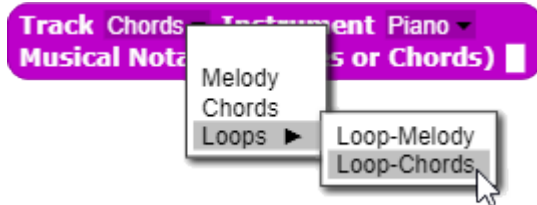
Music tracks formed in this manner can then be played with the **Play Tracks** block.



The **Play Tracks** block can then be used to combine melody, chord, and drum tracks to compose and play a tune.

Topic 9.9 Chord Loops

In music it is common to create loops in which the same sequence repeats. The block provides the capability to repeat a sequence of chords for as long as the melody track is playing. A looping option for either a melody (individual notes) or chords is available in the **Track** block.



A track that loops must be combined with at least one melody track. The length of the melody track then determines how long the looping track will play.

Exploration 9.9 Musical Loop

Use a looping chord progression as a backing track and combine it with a melody track.

Topic 9.10 The Blues

The twelve-bar blues is one of the most influential chord progressions. The blues is a musical genre that can be played with just three chords. Because thousands of songs can be played with these three chords, it is a form that is accessible to musical novices.

The blues originated with Black musicians in the nineteenth century. The blues influenced many of the popular music forms that followed, including jazz, rhythm and blues, rock and roll, pop, and rock music. The most common blues format consists of a line sung over the first four bars, repetition of the line over the next four bars, followed by a concluding line over the last four bars. These measures follow a I-IV-I-V-IV-I progression. The I chord is played for four measures, the IV chord is played for two measures, the I chord is played again for two measures, the V chord is played for one measure, the IV chord is played for one measure, and then the I chord is played for the last two measures.

For convenience, a section of music that may be repeated more than one time can be placed in a **Section** block. This makes a sequence of music easier to both duplicate and visualize as a grouped section of music.



A sequence of sections can then be placed in the **Play Tracks** block.



The song *Crossroads*, recorded by Robert Johnson in 1936, is a good example of this form.

I went to the crossroad. Fell down on my knees.
 I went to the crossroad. Fell down on my knees.
 Asked the Lord above, "Have mercy, now, save poor Bob if you please."

Ooh, standin' at the crossroad. Tried to flag a ride.
 Ooh-ee, I tried to flag a ride.
 Didn't nobody seem to know me, babe. Everybody pass me by.

Four bars of musical chords are played as each line of the song is sung. When *Crossroads* is played in the key of C, the following chords accompany each line.

C Chord	C Chord	C Chord	C Chord
F Chord	F Chord	C Chord	C Chord
G Chord	F Chord	C Chord	C Chord

This same progression can be used with minor chords as well. To create a melancholy sound, any of these chords can be played as their four-note *Seven Chord* variant.

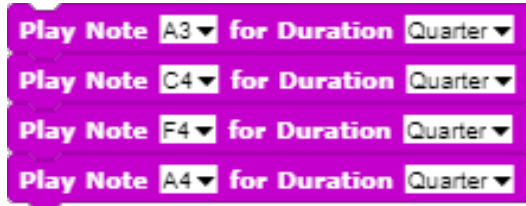
Exploration 9.9 Complex Chord Progressions

Try building a chord progression like the one above. Try changing some of the major chords to seven chords. How does that change the overall sound of the chord progression?

Appendix A TuneScope Blocks Introduced

Play Note

The **Play Note** block plays a note for a given duration but doesn't wait for that note to end before passing control to the next block.



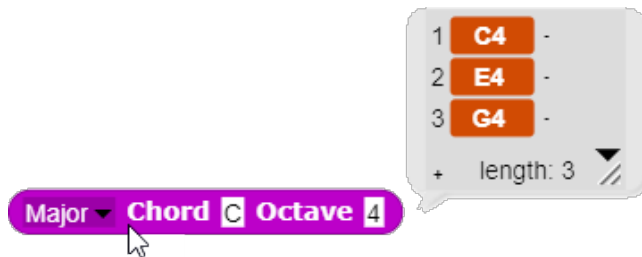
Play Chord for Duration

The **Play Chord for Duration** block plays a chord for a given duration and waits for the chord to finish playing before passing control to the next block.



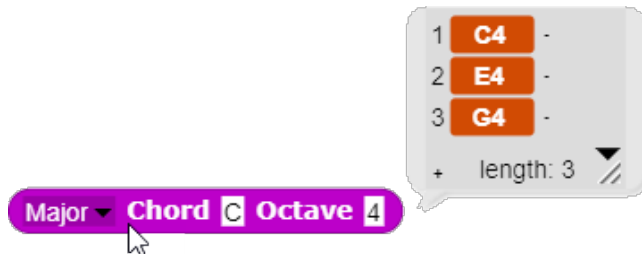
Major Chord

The **Major Chord** reporter block reports the notes in a major triad chord.



Minor Chord

The **Major Chord** reporter block reports the notes in a major triad chord.



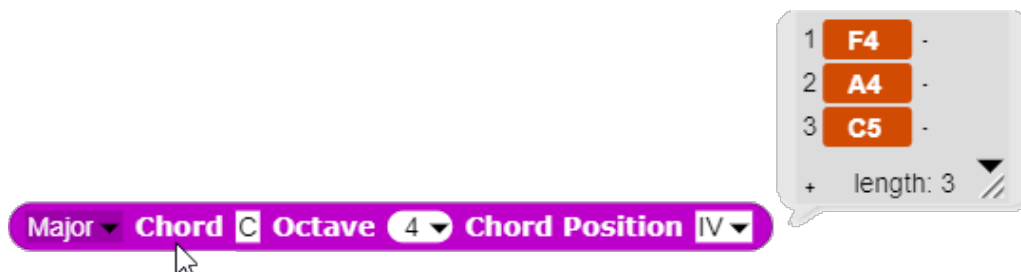
Add Note to Chord

The **Add Note to Chord** block reports a chord paired with an additional note appended.



Major Octave Chord

The **Major Octave Chord** block reports a chord from a selected position within a major scale.



Minor Octave Chord

The **Minor Octave Chord** block reports a chord from a selected position within a major scale.



Section

The **Section** block reports a series of measures containing chords.



Chord Track

The **Chord Track** block reports a series of chords and assigns an instrument to play them.



Appendix B

Seven Chords

A *Seven Chord* can be formed by adding the seventh note of either a major or minor scale to a major or minor chord, creating four possible ways in which this type of chord can be formed (summarized in the table below).

Ways in Which Seven Chords are Formed			
<i>Original Chord</i>	<i>7th Note of</i>	<i>Name</i>	<i>Notes</i>
C Major Chord	Major Scale	Cmaj ⁷	
C Major Chord	Minor Scale	C ⁷	The first 7th chord to appear regularly in classical music. Also known as the <i>Dominant 7th</i> chord. Used extensively by blues musicians and barbershop quartets.
C Minor Chord	Major Scale	Cm ^{M7}	This chord is rarely used in rock and pop music. It is predominantly found in jazz, classical, and flamenco. It is also the chord notoriously used in Alfred Hitchcock's film <i>Psycho</i> , colloquially known as the <i>Hitchcock Chord</i> .
C Minor Chord	Minor Scale	Cm ⁷	