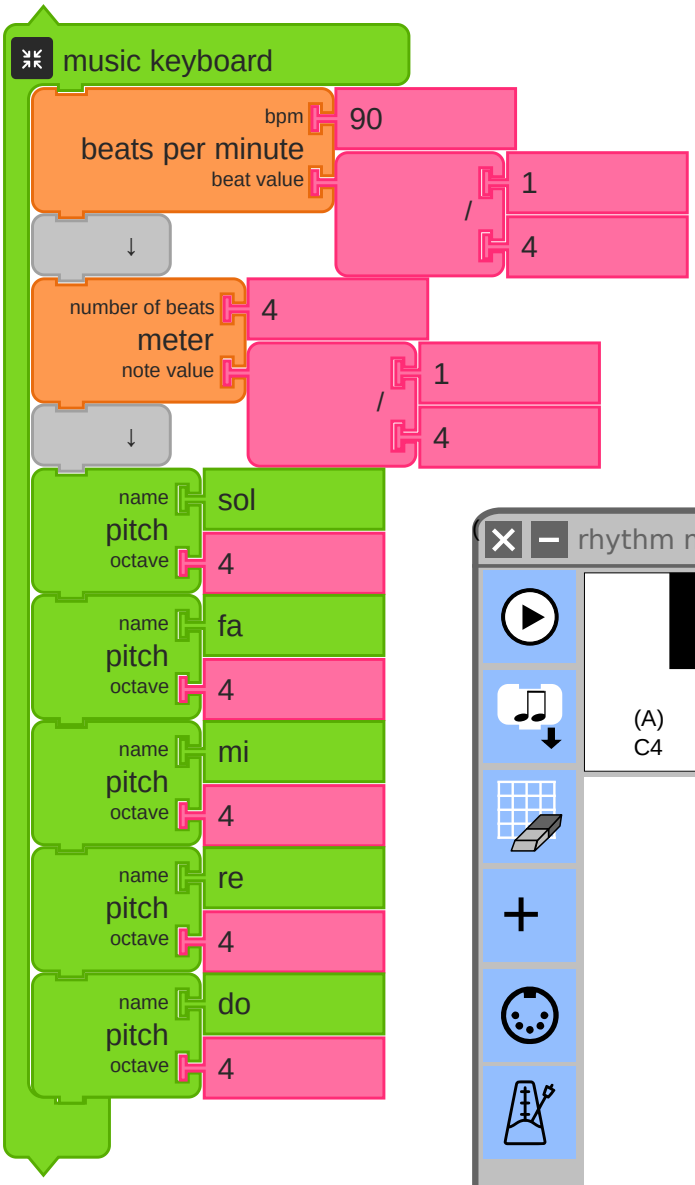
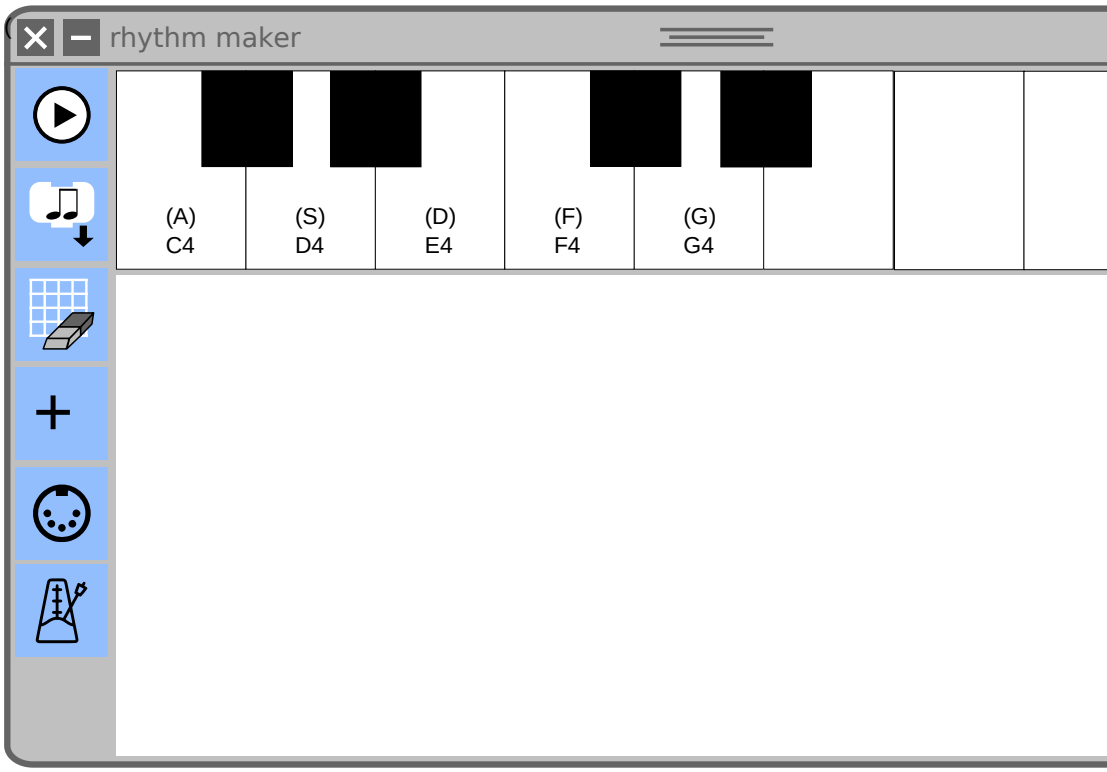
# 4.11 The Music Keyboard

The Music Keyboard is used to generate notes by pressing keys of a virtual keyboard.

When there are no *Pitch* blocks inside the widget clamp, a keyboard with all keys between C4 and G5 is created.



When there are *Pitch* blocks inside the widget clamp, a keyboard with only those pitches is created.

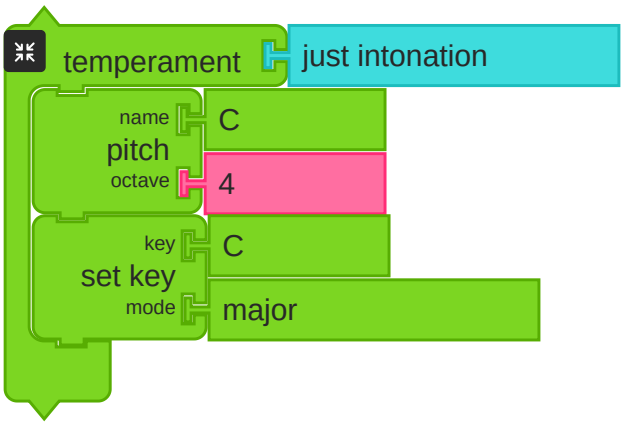
Click on the keys to hear sounds. Click on the Play button to playback all of the notes played. Click on the Save button to output code (a series of *Note* blocks). The Clear button is used to delete all keys pressed previously in order to start new.

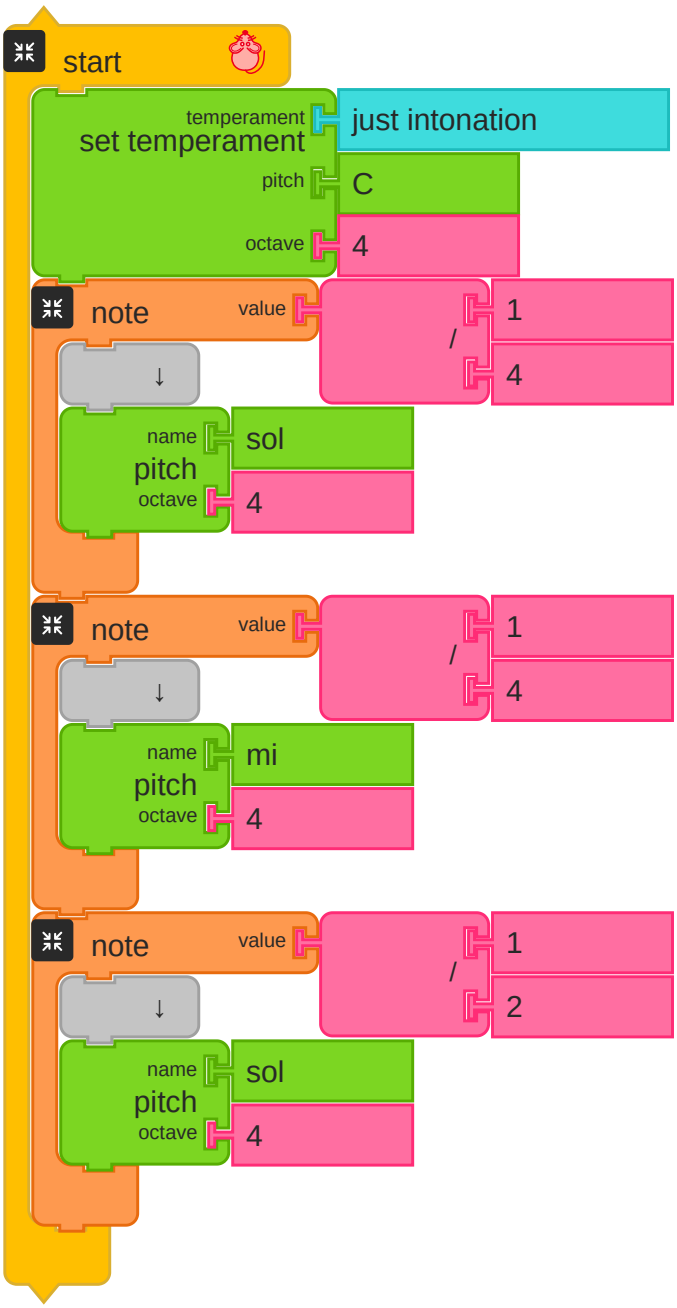
The MIDI input allows for a using a MIDI device to generate notes.

The metronome feature will generate a beat to enable candence.

## 4.12 Changing Temperament

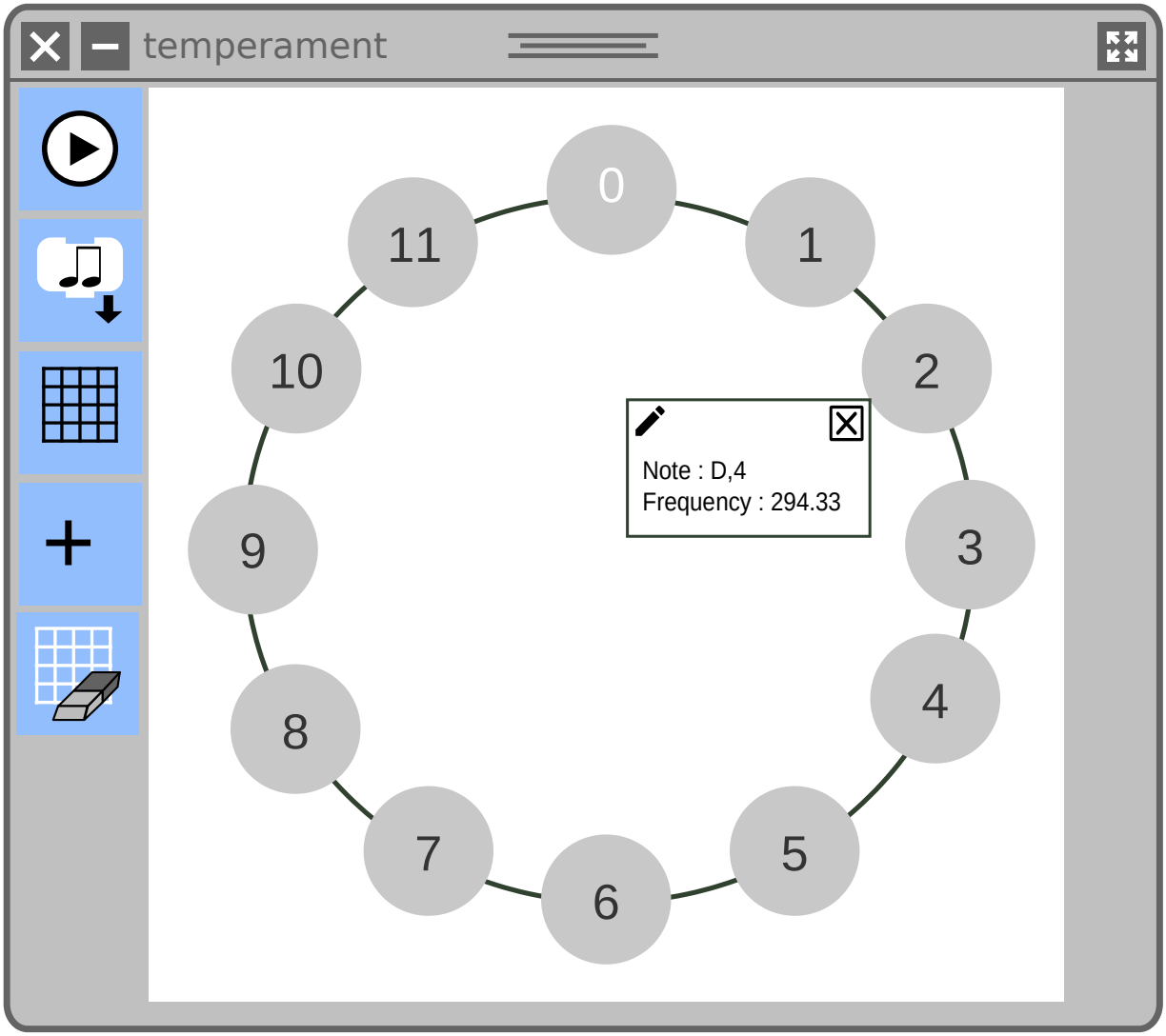
*Tempering* is the process of altering the size of an interval by making it narrower or wider than pure. It is also possible to change and create different tuning systems.



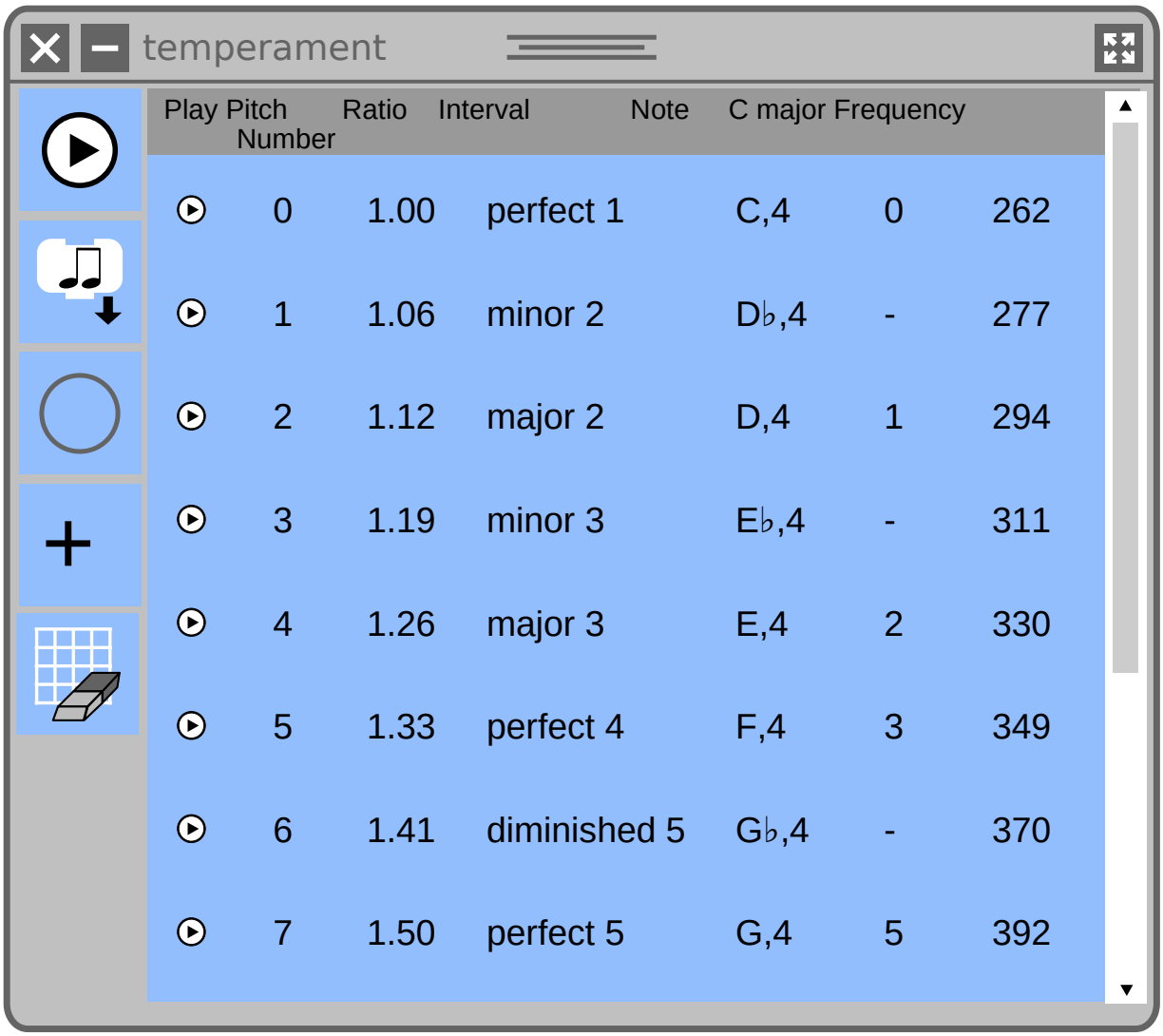

The *Temperament* block is used to launch a widget that enables the user to visualize and edit notes within an octave.

You can select a temperament system from the pie menu which is passed as an argument to the block. This name is passed to the *Set temperament* block in order to play the notes in selected temperament system. *Starting Pitch* is the argument of pitch block inside temperament block. In the above example, starting pitch is `C4`.




In the above example, selected temperament is *Just Intonation*. Notes within an octave can be viewed in the form of circle. These circles represent *pitch numbers*. Note that the pitches that are closer together in selected temperament system are visually closer and pitches that are farther apart looks farther.

The information regarding any note can be viewed by clicking on the respective circle. In the above example, circle (pitch number) `2` is `D4`. The frequency of note can be changed through edit button (left hand side corner of note information popup).




Information regarding notes can also be viewed in the form of a *table* as shown in the above example. The table will show all the information about pitches that lie within an octave. This information includes *pitch number*, *interval*, *ratio*, *note*, *frequency* and *mode*.

The frequency of any note is calculated by `Starting Pitch Frequency x Ratio`.

The widget controls are as follows:

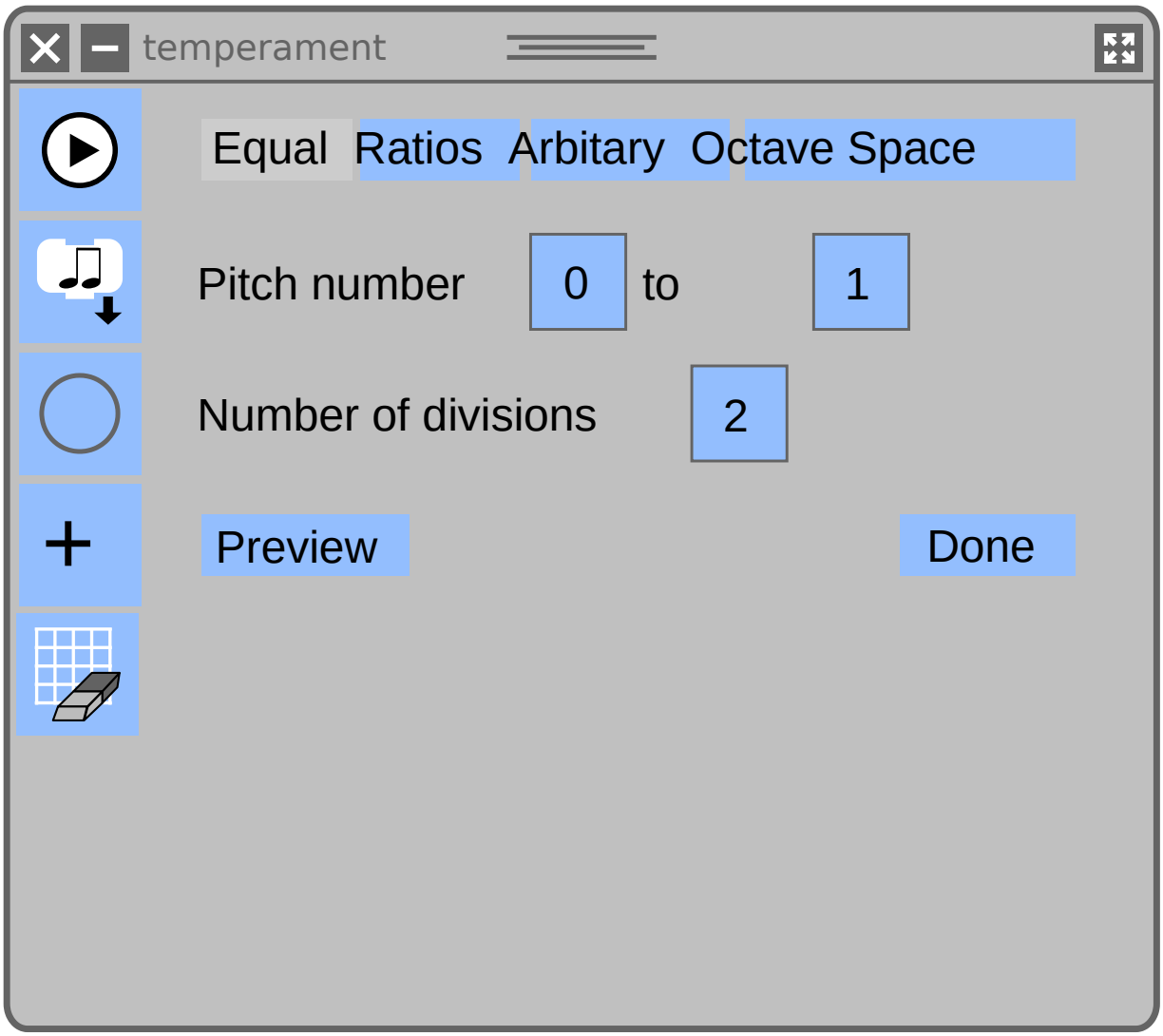
The *Clear* button at the bottom of the widget will clear all pitches except for a single `0` from which the user may add pitches.

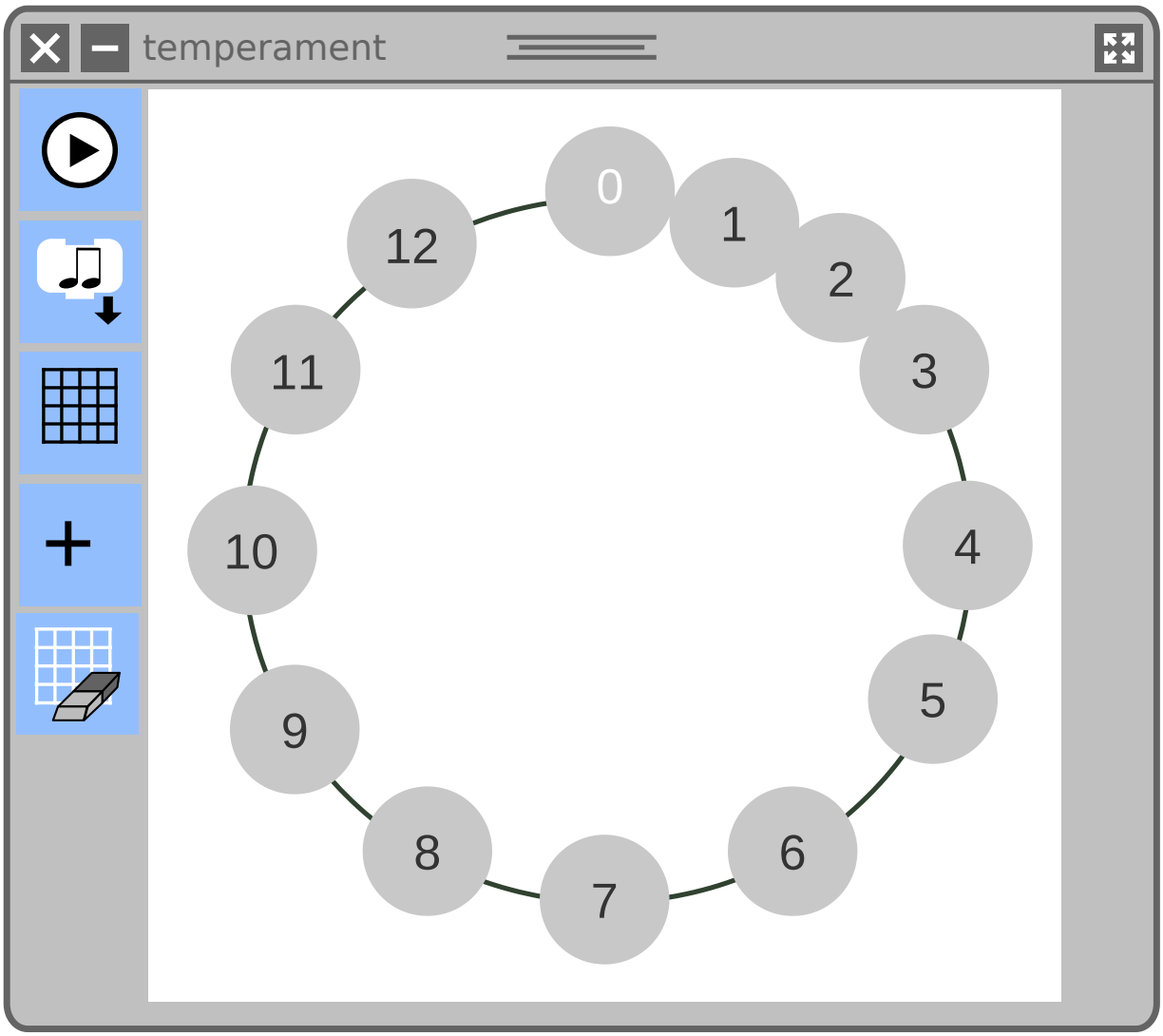
The *Play all* button will play through all the pitches in an octave and then it will play backwards down the pitches.

The *Save* button will save custom temperament for use in your program. It will create a *set temperament* block. This block will tune the notes attached to it according to the selected temperament.

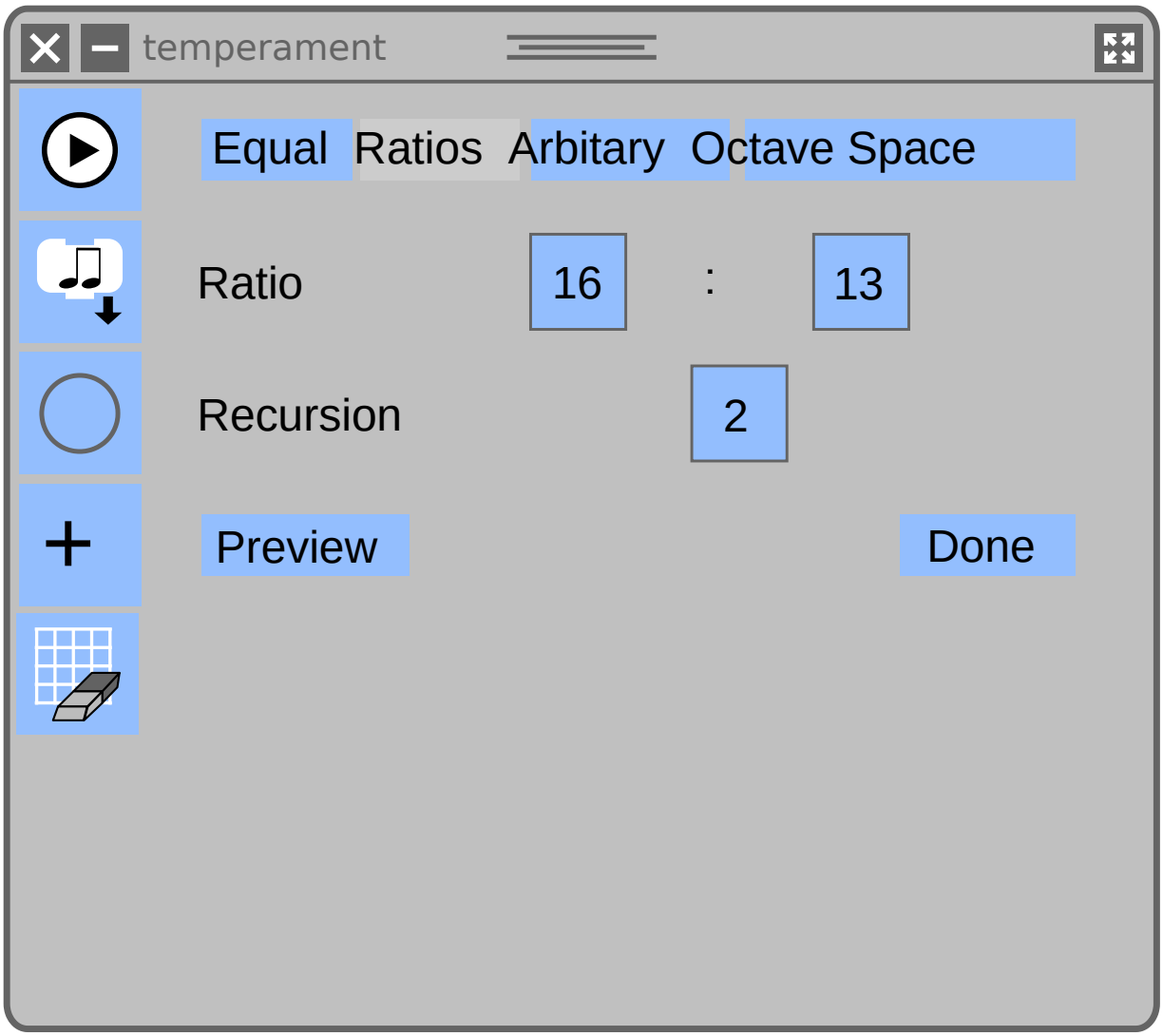
The *Table* button is used to toggle between circular and tabular representation of notes.

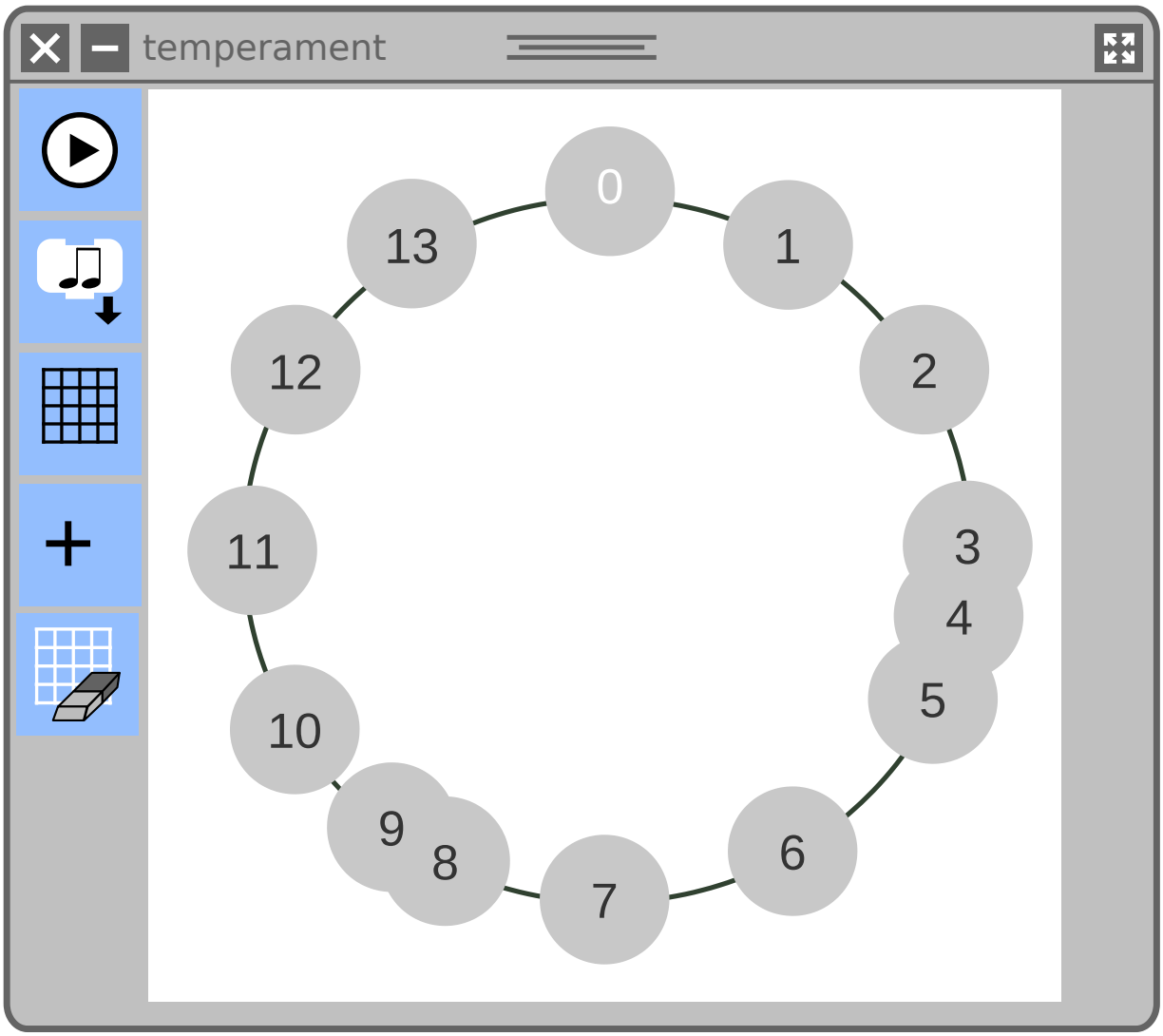
The *Add* button is used to edit notes through different tools:


temperament
Equal Ratios Arbitary Octave Space
Pitch number
0
to
1
Number of divisions
2
Preview
Done

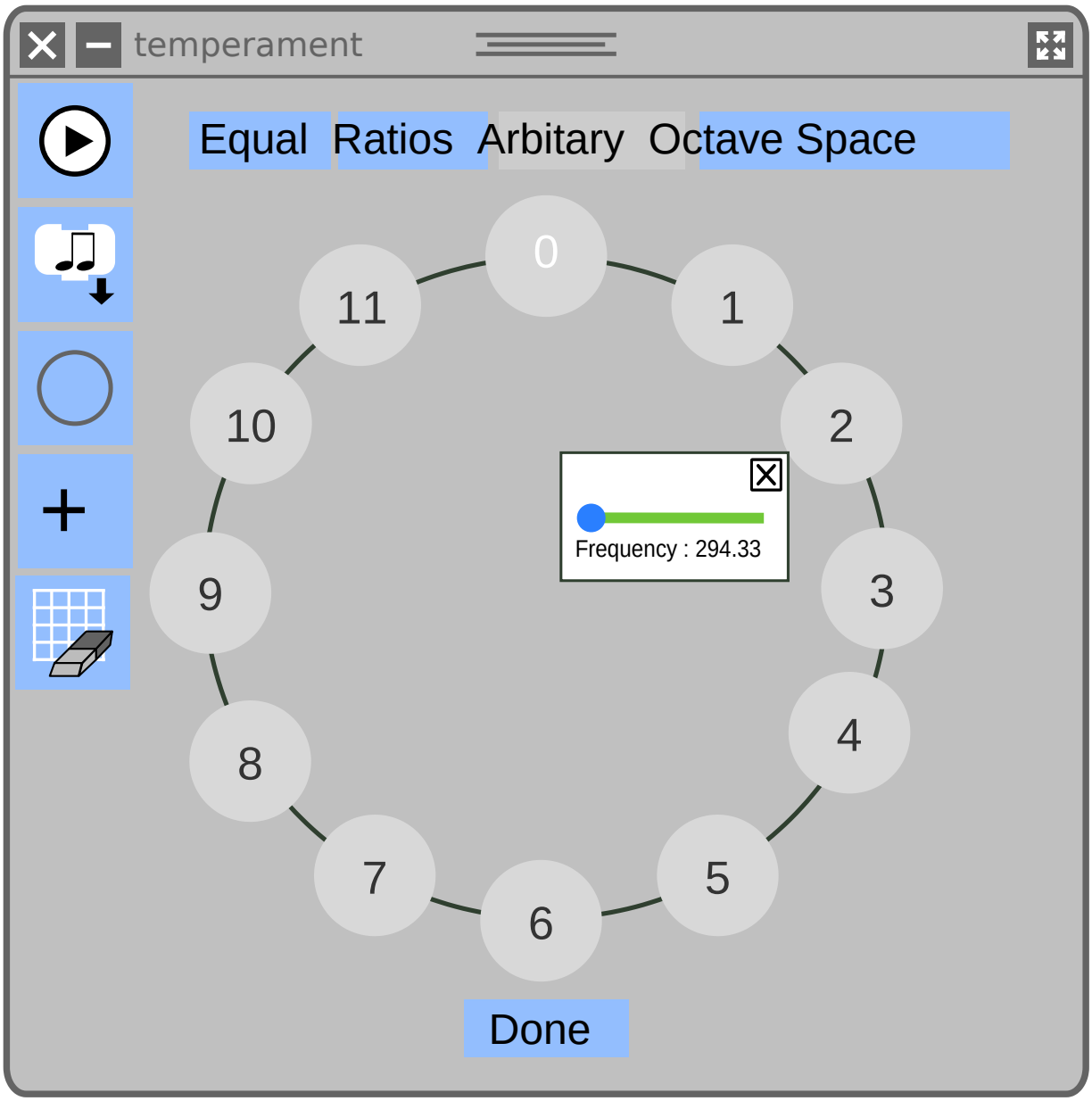



The `Equal` edit tool is used to make *equal divisions* between two pitch numbers. In the above example, two equal divisions are made between pitch numbers `0` and `1` and the resultant number of notes within an octave are changed from 12 to 13.

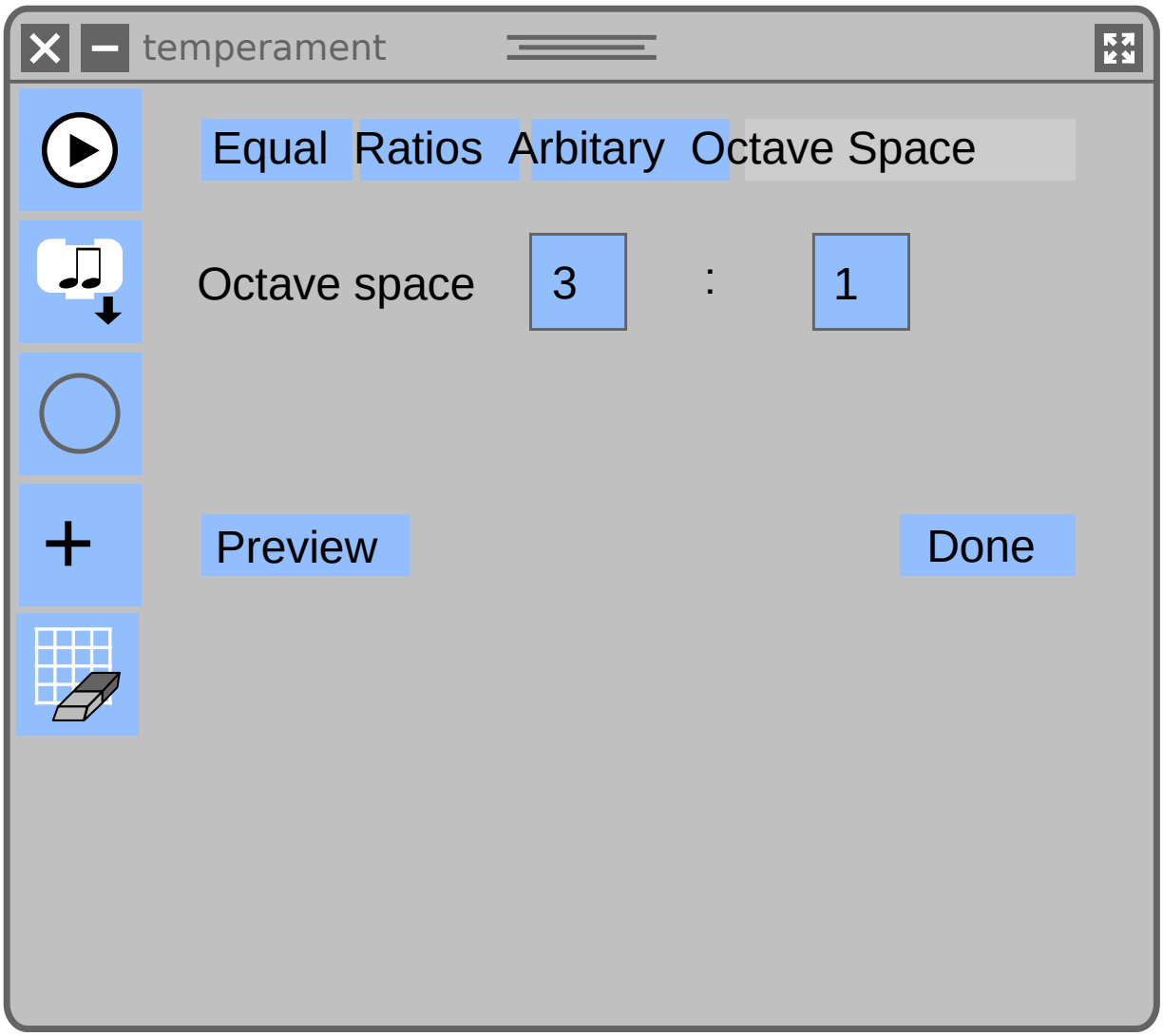

temperament
Equal Ratios Arbitary Octave Space
Ratio
16
:
13
Recursion
2
Preview
Done




The `Ratio` tool is used to add notes of specified ratios in such a way that the resultant pitches wrap inside a single octave. Recursion represents the number of times notes ratio calculation is repeated. In the above example, 2 notes are added in pitch space and the resultant number of notes within an octave are changed from 12 to 14. Frequency of first pitch is (Starting Pitch Frequency) * (16/13) and second pitch is (Starting Pitch Frequency) * $(16/13)^2$.




The `Arbitrary` edit tool is used to add a note in an arbitrary position. In this panel, whenever the user hovers over the outer circle, a frequency-slider window pops up, allowing the user to add a note according to a chosen frequency. In the above example, a new note will be added somewhere between pitch numbers `2` and `3` by adjusting the frequency slider.




The `Octave Space` tool is used to edit the octave ratio. The standard octave space is 2:1. In the above example, octave space will be changed to 3:1 after clicking on `Done` .

The *Drag* button will drag the widget.

The *Close* button will close the widget.