Violin Lessons

Introduction

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Violin is a fantastic instrument. You can play almost any style on a violin. With a violin you may use a night sordine, and practice without disturbing your neighbors. With a violin you can play in tune without temperature. We shall proof in this course that he old harmonic scales sounds much better for humans than the modern well tempered scales.

This course has been translated from the Danish course. It may be a little abbreviated and slightly changed (to the better) with respect to the original.

Write to me

I would like to hear your opinion. Send an e-mail if you like the course, of if you think I should add something.

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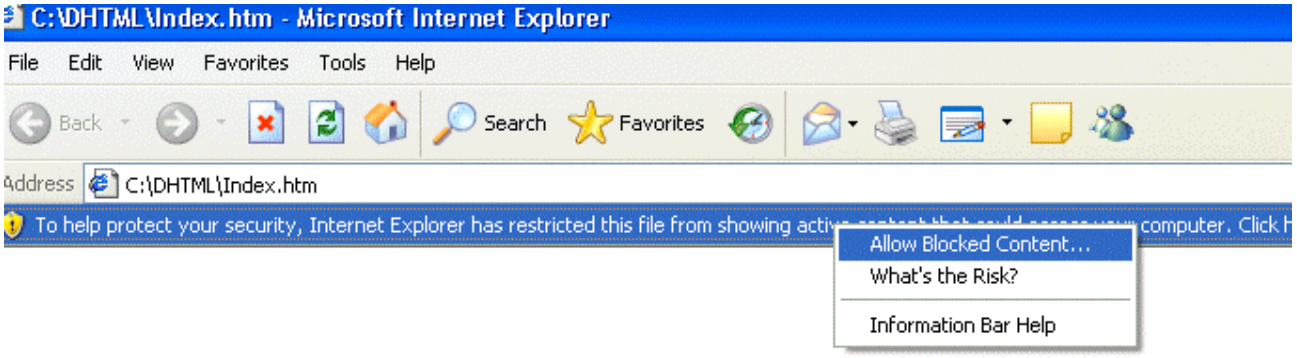
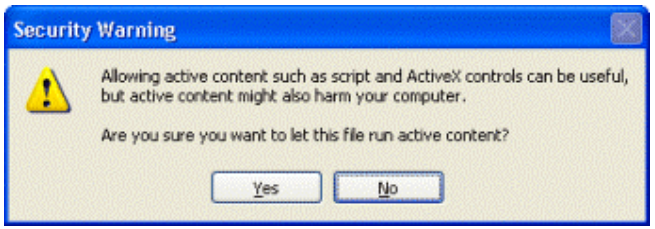
Java Script

Java Script is used throughout this course. If you have Windows XP service pack 2, the JavaScript will be blocked first time you enter a page. You will have to allow the Java Script to run. Please note that the scripts on these pages are tested against Microsoft Internet Explorer only. Some other browsers may not be able to run the scripts. Only some of the pages have the scripts running however.





Sound on the pages

The sound is using JavaScript as well. You may have to install media packages such as Winamp to be able to hear sound on the pages. Some sounds are coming up when you move the mouse above the link, on other you have to click. On some of the link you should not click, because if you do there is an alternative sound possibility made for non MS IE browsers.

About the violin and the bow

Tension the horse tail

The horse tail should be relaxed after you have played. Do that by turning the screw at the frog end of the bow.

The frog then bow tip

relaxed bow

Bow with tension

Violin parts

The violin consists

- The body
- The fret
- Snail with tuning knobs
- String holder with fine tuners
- Bridge
- Cheek holder

Don't touch the string part between the bridge and the fret board. This will put finger grease and make it difficult to play.

Bridge

Rosin on the bow

You should regularly (at least once a week if you are practicing daily) grease your bow with rosin. Make sure that you apply rosin all over the bow, by moving the rosin several times forward and back.

The violin "works" because the bow is gripping into the string. Without rosin on the horse tail, the violin will not say anything.

Do not touch the horse tail of the bow. If the bow becomes greasy it will not make any sound!

Cleaning the string

Get the resin off the string using Propylic alcohol.

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Tuning of the violin

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Pure tones	Tempered tones
Mouse over	**Mouse over**
E 660 Hz	E 659.26 Hz
A 440 Hz	A 440 Hz
D 293.33 Hz	D 293.66 Hz
G 195.55 Hz	G 196 Hz
Click	Click
A-D-string (No Beats)	A-D-string tempered (1.3 beats per second)
D-G-string (No Beats)	D-G-string tempered (2 beats per second)
E-A string (No Beats)	E-A string temped (0.8 beats per second)

Use this to run the notes interupted

6 seconds

stop

About using a tuner

You may use a tuner if you are starting violin. You will soon realize that a tuner being able to tune the violin tempered only, is not ideal. You should be able to tune the violin better than that! Also it is impractical to use a tuner if you are out in noisy environments, where the tuner does not work. As a reference the tuner can be very useful however.

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How to tune

Start with A-string then he D-string the G-string and finally the E-string. Lift the bow and listen for the beat in the note. The beat will be explained later.

Holding the violin

Be relaxed!

It is of utmost importance that you relax when playing violin

Use a mirror

Check in the mirror that you are relaxed when playing. It is a good idea to regularly check your movement in a mirror when you practice violin. Especially you should focus on being relaxed. Other points of focus are:

- Is the bow moving perpendicular across the strings
- Is the left arm moving correctly as I go down to the low strings
- How is my right hand moving when the movement of the bow is turning

Hold the violin using your cheeks

You should be able to hold the violin between your cheek and your shoulder, this allows for the best movement of your fingers.

Left hand

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A relaxed hand has curved fingers!

Put your left hand on a table. Notice how the thumb and the other fingers are a little bowed when you are relaxed. You should have the same position when you put the fingers on the fret board

When you hold the violin the left hand thumb is still curved. The arm is hanging in the fingers. And the violin is supported by your cheek and shoulders. Not so much by your left hand.

Left arm

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Moving left arm

There should be a straight line from your elbow to your fingers. When you are going to play on a lower string, you should move the tip of your elbow forward. When you go back again, you don't have to think about it! the arm will automatically move back.

Fingers

The fingers should hang at the freeboard. When you get on to the E-string there should be a small distance between the index finger and the fret board. (On the other strings there is no distance)

Notice the thumb position. As mentioned the thumb is curved. You do not hold the violin with the hand, the violin is held with your cheek.

Holding the bow

Right hand

You should have the same point of origin when holding the bow, as when holding the violin. A relaxed hand has curved fingers!.

Before you start playing you should tighten the hairs of the bow.

The bow is kept with an angle away from you. (The hairs are closest to your face; look at the picture)

Look at the lower picture how the thumb is slightly bent.

For starters

Starters (children) may hold the thumb under the frog of the bow.

Moving the bow

Look at this fill how you should move the bow perpendicular across the strings

If you are playing loud you should move the bow closer to the bridge.

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The famous German mathematician Helmholtz explained how the violin is working Get the explanation here.

Movement of your right hand

The right hand is smoothly moving. Check on the film how the wrist starts moving a little bit before the turning of the bow movement. It is a little bit like when you are painting using a paint brush.

If you study how this movement is done in the mirror, it will be easier to play together with other people later, since you will be able to see when they are making a new note, before they actually make it.

About the fingering table

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On next page you may see the fingering by selecting different keys

The page is script based

There are four basic fingerings on a violin

1. There is a half note between 1st and 2nd finger
2. There is a half note between 2nd and 3rd finger
3. There is a half note between 3rd and 4th finger
4. No half notes all fingers are equally separated

Select the "Major scale" dropdown, and move through it with the arrow keys. Can you see there is a pattern? It is because the violin is tuned in fifth, and the keys are moving in a fifth cycle.

Question: *Are there other possibilities?*

Answer: *Of course yes, if you are playing chromatic scales, moving accidentals or even harmonic minor, you have other fingerings, but above are the normal ones when playing major scales*

1. 

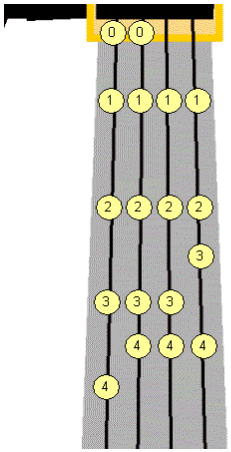
2. 

3. 

4. 

Note

The tool works fine in first positions, but in higher positions for Eb, Bb, F and C major it jumps a position. This will be fixed in next version of this program.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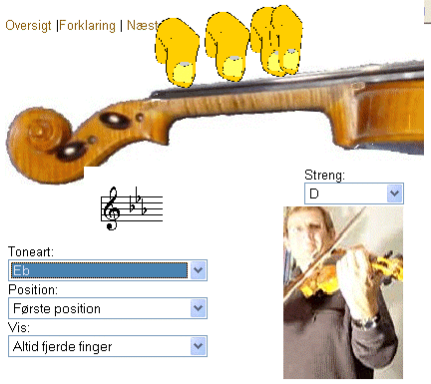
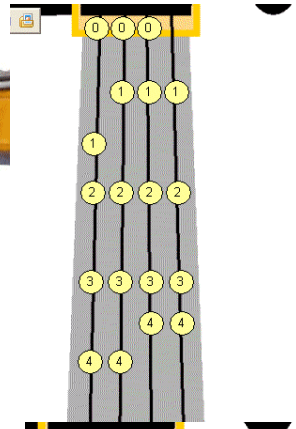
4


Oversigt |Forklaring | Næst
Streng:
D
Toneart:
Eb
Position:
Første position
Vis:
Altid fjerde finger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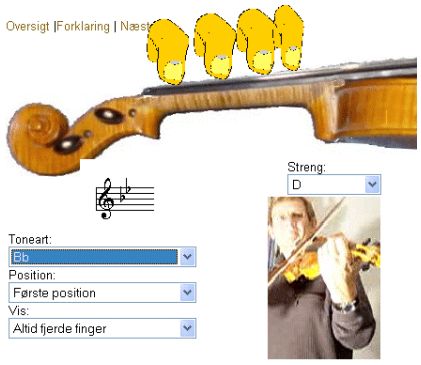
2 2 2 2
3 3 3 3
4 4
4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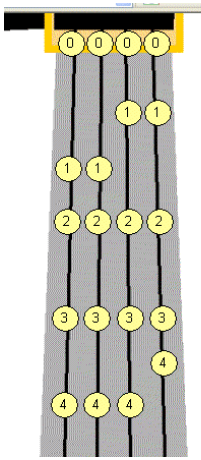
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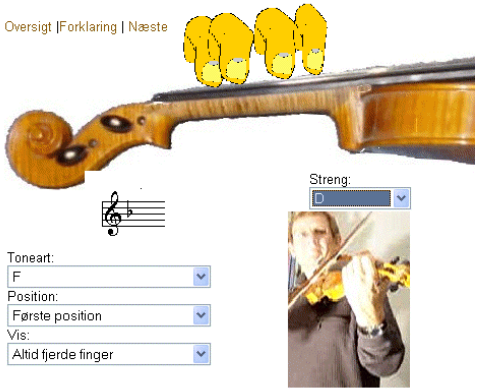
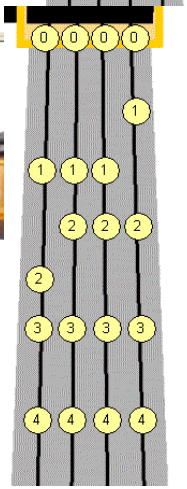
1 1
2 2 2 2
3 3 3 3
4
4 4 4


Oversigt |Forklaring | Næste
Streng:
D
Toneart:
F
Position:
Første position
Vis:
Altid fjerde finger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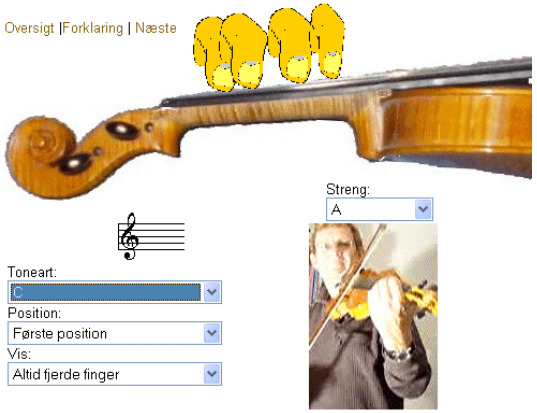
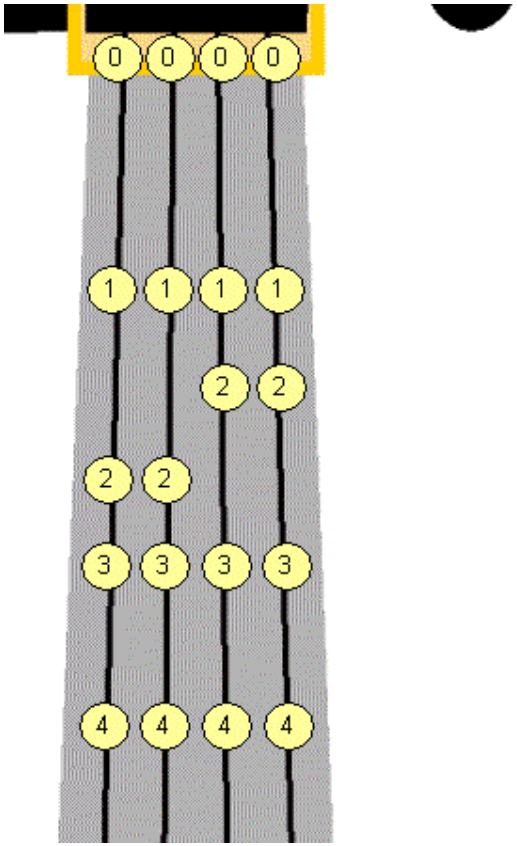
1 1 1
2 2 2
2
3 3 3 3
4 4 4 4


Oversigt |Forklaring | Næste
Streng:
A
Toneart:
C
Position:
Første position
Vis:
Altid fjerde finger



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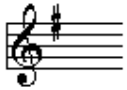


Streng:

A

Toneart:

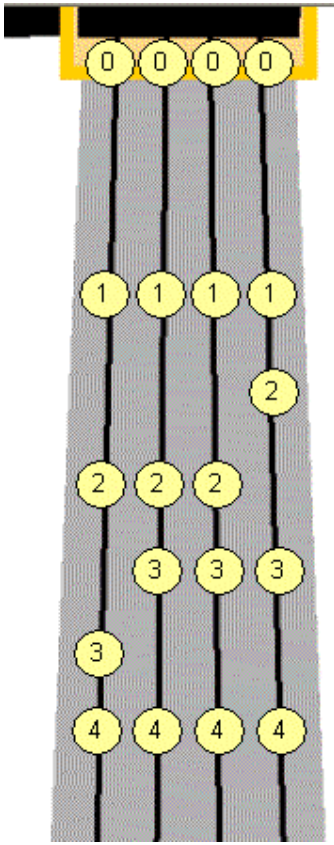
G

Position:

Første position

Vis:

Altid fjerde finger



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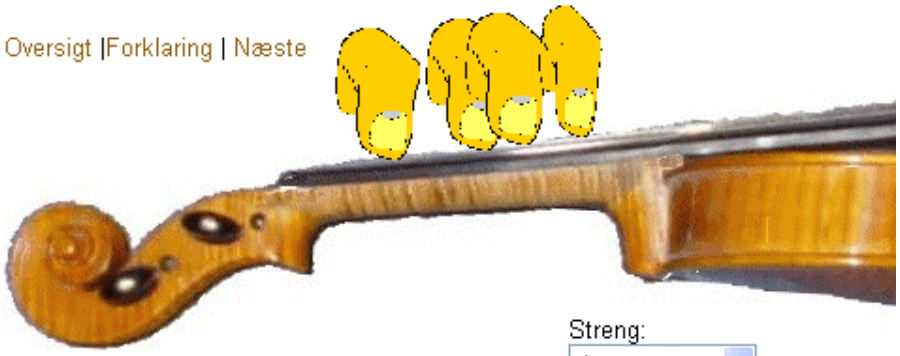
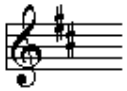




Streng:

A

Toneart:

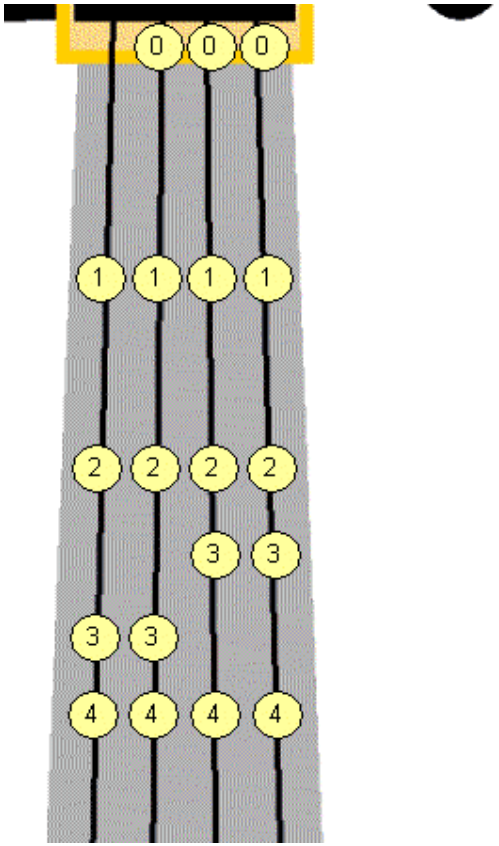
D

Position:

Første position

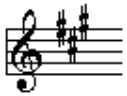
Vis:

Altid fjerde finger



Streng:

E



Toneart:

A

Position:

Første position

Vis:

Altid fjerde finger

Playing in tune

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About intervals| Interval Overview | Tuner

To intone

On a violin it is necessary to intone. If you do not put your finger on the right spot, you will play out of tune. Use your ear. Playing in tune can be learnt, for some people it is easier, but everybody can learn it.

There is a number of different intervals coming from the Pythagoras scale the natural scale or the tempered scale.

Using a tuner

I recommend using a tuner. You will be able to do better than a tuner down the road, but a tuner is not that bad, and if you are going to play with other instruments, like harmonicas and pianos you should play the tempered scale anyway.

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Playing in tune (2)

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About intervals| Interval Overview | Tuner

Compare with loose strings

When you start playing violin you will play in "easy keys" such as C, G, D, and A major. Here it is always possible to find an interval up against the note you are playing, for checking if you are in tune. Beware of the comma of Didumos. Comparing first finger on the A string with E, does not yield the same result as comparing with the D-string. More about this later.

The note of Eb does not compare against anything. Here it is nice to have tuner to compare with. Just play the note slowly when you are practicing, and learn its position. (The tuner can not follow you as you are playing, but you may stop up for checking) It is easier to do the check if you have connected a microphone to the tuner, and put the microphone on you violin.

Playing rhythmically

Unfortunately this course has much more pages on how to play in tune than how to play rhythmically correct. It should be the opposite. It is when you play rhythmically you catch the audience. Playing dance music means keeping the beat. It is however difficult to describe in words what a good rhythm is. Here some good hints on how to learn how top play rhythmic:

1. Play together with other people
2. Play for dancers
3. Practice together with CD's, records, mp3's or even the radio
4. Find a good metronome
5. Get a good feeling for playing
6. Go out and play for people, visit bars, and other places where you may perform your music.

When you play it is important to keep a steady beat. But remember that making the rhythm interesting means making small rhythmical changes between every note. Giving the melody a feel and good phrasing. Using microagoical changes.

Play together

When you are playing together with other you are forced to keep a good rhythm.

Lean back on the beat

The most common error when playing together is to play faster and faster. This is because if somebody is a little bit before the beat, everybody will hear that, and feel that they are behind, they try to catch up, but the if guy playing before the beat continues to do so, he will also be before the faster beat. When you play before the beat, everybody will here it, because often there is a small pause between every tone. If you lean back and play after the beat, the other people will not hear it in the same way, because now you are playing in their tone. The trick to lean back is to do it just over some chosen tones, where you want a special effect, where you want people to listen. Keep up with the basic beat inside you so you do not loose the pulse of the music.

Play for dancers

It is a privilege to play for dancers. Try to communicate with the dancers while you are playing. Can you feel that they like what you are doing. Try to locate the best couple on the floor and follow their movement.Music is communciation. Music and dance grew up together.

Practice with records, CD's or mp3's

Find a good record with some music that you like. If you cannot follow: use a computer program that can slow the music down, without changing the pitch.(There are several programs on the market that can do that.)

Don't stop when you have learnt the melody. Try to concentrate on phrases, and agagics. See if you can copy the small changes within the rhythm that makes the music to music.

Don't be afraid of copying a style. The better you get in your ability to copy other peoples styles, the better you will be to pick up the style of the people you are playing together with. The better you will get to make a uniform style.

Look at it this way: The more styles you learn, the more tools you will have in your bag when you are creating your own style when you are performing.

If you are learning from a midi-file, remember that midi music is not music.It does not contain any phrasing making it live. Here you have to do the job yourself of putting feelings into the music.

Metronome

Don't buy a traditional metronome. They are dull to play with. The best metronome I know is the program Band in a Box. If you are interested in Swedish traditional music, I have made a polska metronome (by using Band in a Box.)

I have made some online examples using Band In a box, and put them on my site here and here

Practice slowly

When you start playing a new melody. Practice slowly. Keep the beet, but do it slowly. Playing slowly in the start is the fastest way of learning how to play fast. Cut the melody into phrases. Practice phrases that are difficult by repeating these phrases only. When you feel confident that you now the melody you can gradually increase speed. Make sure that when you are

increasing the speed, that you do it in steps. (So you do not learn how to play accelerando, you should always keep the beat when you are playing). You may have to practice the same melody several month until you can play it in it's real tempo.

Learn to play fast

It is good to be able to play fast. If you can play fast, you will be more precise also when you are playing slow melodies. You have to be very precise in order to play rhythmically correct.

Take a simple melody. For example "Soldiers joy". Increase the speed gradually until you can play it really fast. Be sure that you are relaxed when you play it. Don't force yourself.

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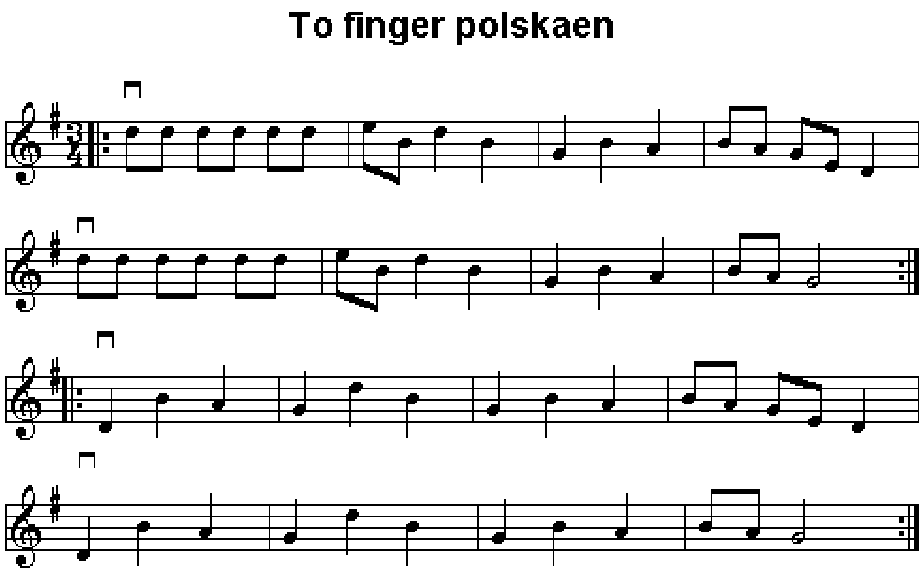
Two finger Polska

Polska is a Swedish folk song. You should stress 1 and 3 when playing. This polska is particularly simple, you can play it using 2 fingers only.

Two finger polska



Just put the mouse above the links for playing and stopping

play melody | Stop melody

Symbols for bowing up and down.

Down means in direction of the point of the bow

To learn melodies

Overview| Next

We will now discuss how to learn melodies

After having finished this course

I will not put a lot of melodies into this course. If you want to learn more I can recommend the melody collection at the home page of Folkets Hus in Nørrebro, Copenhagen where you may find more than 1300 Scandinavian folk tunes.

If you are interested in playing jazz, I can recommend Band-in-a-Box. I have put some examples of jazz music exported to mid format from Band in a box here.

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Using note sheets

It is a good thing to know how to read music sheets for examples if you are going to Folkets Hus collection of notes.

But....

It is not the best way of learning how to play a melody.

The sheet music tells you something but not the full story. It does not tell you how to put feelings into the music. You will experience that although it is fast to be able to play after a music sheet. It takes longer time to learn a melody by heart, if you started reading it. It is much faster to learn the melodies by ear if you want to remember them.

For learning how to read music I can recommend Band in a box, here you get the melodies in both by ear and by sight.

Always start playing slowly

When you are learning a new piece of music start slowly and increase the speed slowly. Do not make accelerando as you are playing, but increase the speed from the start of the melody and play in the speed you have chosen. If there is a place that is hard to play repeat that place only.

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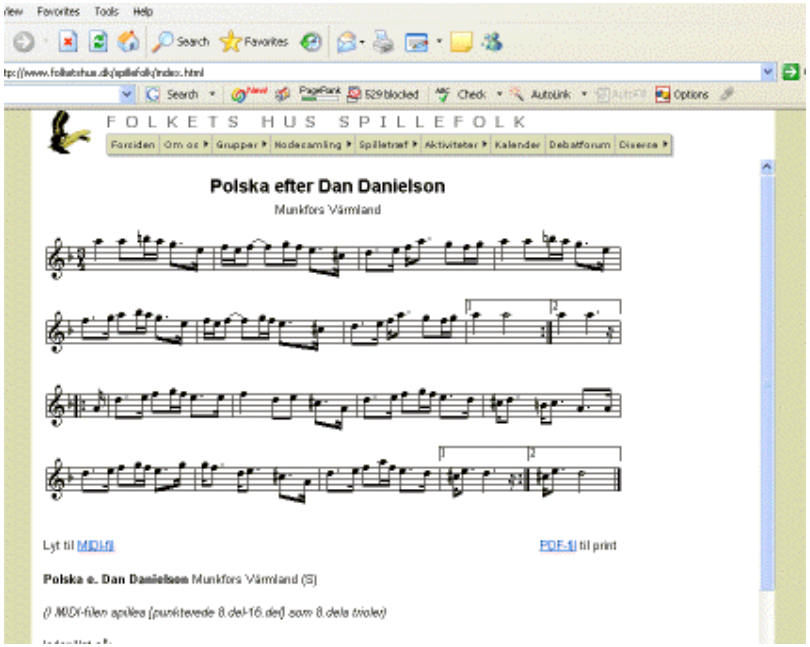

We have a good collection of Scandinavian folk music at folkets hus, but the music sheets and the midi files does not tell the full story.

Playing recorded music

It is a good idea to listen and play together with records. Especially listen for the phrasing. Don't hesitate to copy what you hear. The ability of copying other people is a good ability to have when you play together with other people and you want to unify your sound.

Today you may get software that can slow down the music without changing the pitch.

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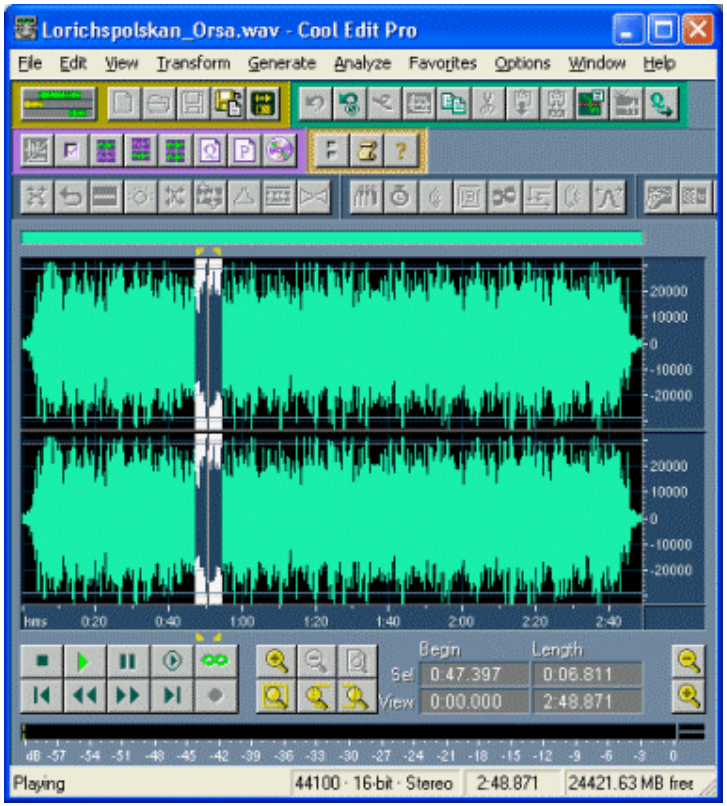

By a teacher

You will often be in a situation where you are going to learn a melody from other people or where you are teaching other people

- First the teacher plays the melody. The pupils should not play now, only listen.
- It is a good idea to sing the melody. Singing is often easier than playing for most people
- The teacher should split the melody into short strophes which are learnt by heart. It is a challenge to put the right strophes in, and to repeat them until everybody have them under their skin.
- Work especially on the difficult ones.
- You can go on before everybody have learnt the strophe 100%. But people should be somehow confident before you go on.
- Play the strophes in a slow tempo. The teacher should tell the pupils every time he plays faster, so you do not train accelerandos.
- When you have learnt a full repetition you should play this repetition more than twice. Discuss the endings if they are different.
- When you have learnt the full melody, repeat it many times. Put up the speed slowly. You do not have to reach full speed in a session. If their are ornation, put on the ornation as the last thing. If there is special phrasing, this should be discussed at this point.

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Just playing along

Most Scandinavian music is quite easy to learn, when you have learnt the style it is quite easy to pick up a new melody. Since all melodies contains repetitions and dance music is repeated many times, it is possible to pick a melody up while playing. Make sure that you play very softly so the total music does not get destroyed by your learning efforts!! Often you may during a melody be aware of where you have difficulties, and pick the problem notes up one by one for every

repetition.

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Just playing a melody that you have heard

Sometimes you may just play a melody you have heard. This ability should be a goal, then you can play anything at any time. And you have become a fast learner.

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Playing together

Having a conductor

If there is a conductor in the band, you should concentrate on following his will with the music. Below paragraphs are written for bands without a conductor

Copy the style

When you play with other people. Listen how they are playing. Try to copy their style. When you have done that you can try to "pull" them over to your style. If everybody are doing the same, you will find a common style when you are playing together. If you cannot find a common style, and you feel that you have a style that everybody can unite around, then keep the beat and promote your style

Give and take

Playing together is a give and take, you give a little of your self and you take a little of what other are giving, in this way may find mutual harmony and your music will unify to a common expression.

To play in half circle

As your band grows you may form a half circle. The speed of sound is 330 m/s, if the radius of your circle approaches 10 meters, you will have difficulties playing together simply because of the sound delay. (If you are playing 200 Beats per minute) 10 meters distance corresponds to a 3-th note in delay. It is possible to play together, but it is difficult to be very precise. 20 meters distance corresponds almost to a 16th note in delay it is now almost impossible to play together.

A trick is to look at bowing hand of the guy standing on the opposite side of the circle. The speed of light is much faster than the speed of sound. So by looking at him you will play simultaneously. Another way of playing together is of course to have a conductor, and look at his movement.

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Performing

Overview|

When you play an instrument you don't do it only for yourself, it is also for the audience. Be sure to learn a couple of tunes really good. The art is not to know a lot of tunes, but a few tunes that you can perform. (If you are often performing for the same audience, you must practice new tunes, so they do not get tired though).

It is a lovely feeling to catch an audience with your instrument. Playing together is not necessarily to play with the other musicians. You can play together with your audience to. Remember that performing is not only your music. Performing is visual too. Use your body when keeping the rhythm. Many musicians use their foot to keep the rhythm. Using your whole body has the advantage that it does not make so much noise. (In some occasions the foot noise is an advantage for the dancers. However most conductors tend to dislike the stamping.

Stop while the play is good. Be aware that not all people like your playing, and it can be boring to listen to. If everybody encourage you to play continue, but not so long that somebody will ask you to stop. The art of performing includes knowing when to stop.

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Tones and Harmony

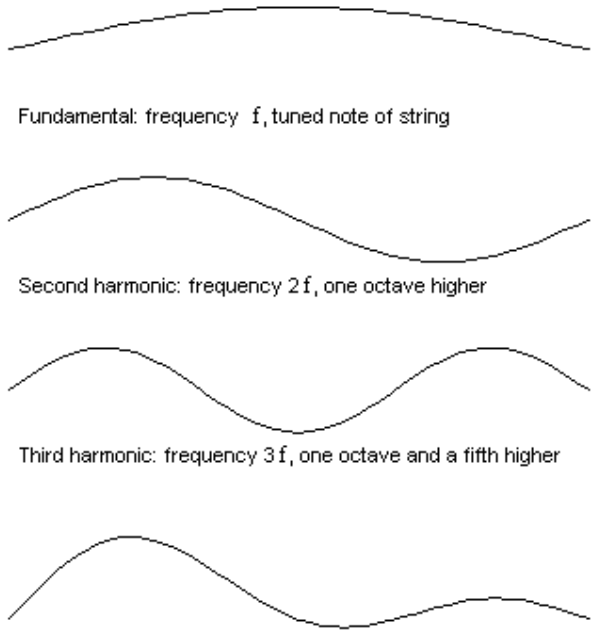
Why include this section

The human brain is strange: The more you learn about a subject, the easier it is to remember. With a violin you can play perfectly in tune. Most people will do that when they are playing alone. While writing this course I realized that music and mathematics has a lot together. One of the greatest mathematician Pythagoras, originated his theory in music. Let's find out where music is coming from, and how western music intonation and the teaching of harmony has developed through the centuries. We will discover something that can be used for understanding how to play in tune.

Pressure and frequency

Sound is normally created by vibrations. The string of your violin is vibrating, the vibrations are transmitted via the bridge to the body of the violin. The violin wood will give resonance (amplification) of the vibration, and the vibrations are transmitted to pressure waves which will reach your ear. Can sound emerge without vibrations? Yes sometimes it can. In a flute for example the pressure vibrations are created by turbulence in the air flow itself.

The pressure variations are very small. Air pressure may be measured in Pascal Pa which is equivalent of one Newton per square meter. The smallest sound that can be heard is a 20 millionth of a Pa. (equivalent of 0 dB) When you are playing strong with a violin, your ear may be exposed to 96 dB. The pressure in the atmosphere is about 101.000 Pa. In other words you may hear sounds which are variations around a 100 trillionth of the atmospheric pressure. Sound is transmitted with a velocity of . 330 meters per second. (Dependent on the air temperature this may vary slightly). The tones are oscillations of the pressure. The oscillations are measured per second or Hertz (Hz) Children's audible range is from 16 Hz to 20.000Hz. When you get older the upper hearing range get reduced.

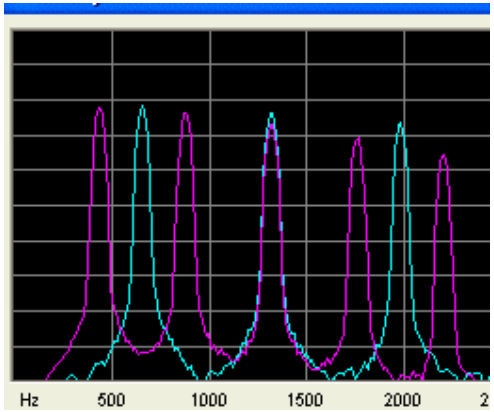


Harmonics

All tones that are not pure sinusoidal contains harmonics. Harmonics are generated from a string because the string can vibrate in different modes, one mode is when the full string is vibrating, another mode is when half

Two notes sounds good together when their harmonic coincides.

The old Greek philosophers realized that harmony was produced when there were a straight numeric relation between the tension of a string or the length of the string. They could not count the frequencies, and understand why. Today we have frequency analyzers and we have an understanding of what causes harmony.



Frequency spectrum of the note A and the note E. You can see that the second harmonic of the E and third harmonic of the A coincides. This produces a harmony for the ear!

Beats and undertones

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Beats

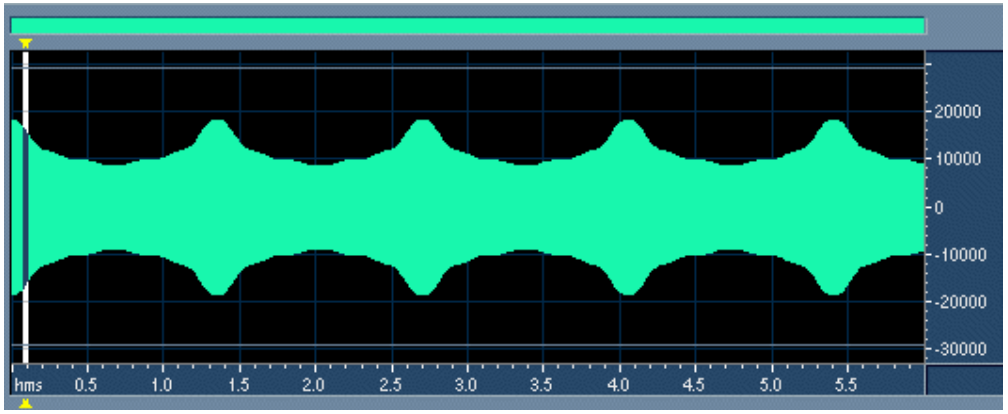
When two tones with a very small frequency difference are played together, a beat tone will be produced. It sounds like whoh-whoh-whoh-whoh-whoh-whoh. The frequency of the beat is equal to the difference in frequency between the two notes.

Listen to the tones 659.26 Hz and 660.00 Hz. (The tempered and the pure E sounding together) You can clearly hear 4 beats on the 6 seconds of the tones, corresponding to the 0.74 Hz difference between the tones.

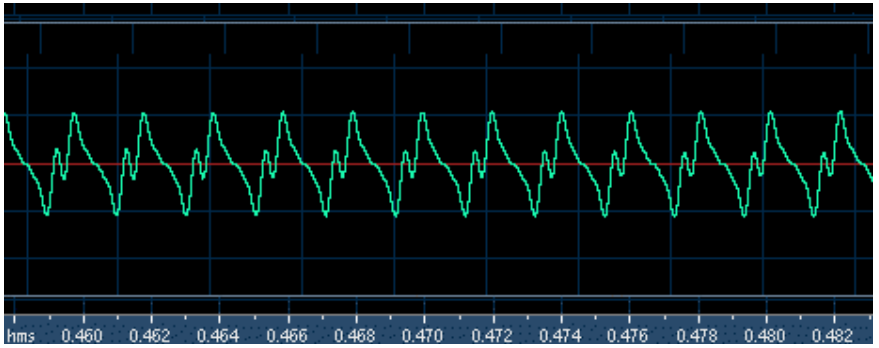
In the tuning section you may clearly hear the beats in the tempered fifth, when you are listening to the perfect fifth there is no beats!

What is beats

Sound is pressure waves in the air. The higher the frequency the shorter the wave. The waves are all traveling with the same velocity. When two waves have nearly the same frequency the wave crests of the will sometimes add, sometimes subtract.



On the picture above you can see what the maximum amplitude of the joining of the two tones 659.26 Hz and 660 Hz looks like. You can see there is 5 distinct beats in the 6 second sequence. Below we have taken out 10 milliseconds and you can see the wave movement by clicking on the link.



Start animation | Slower | Slowly | Fast | Step | Listen to the two tones

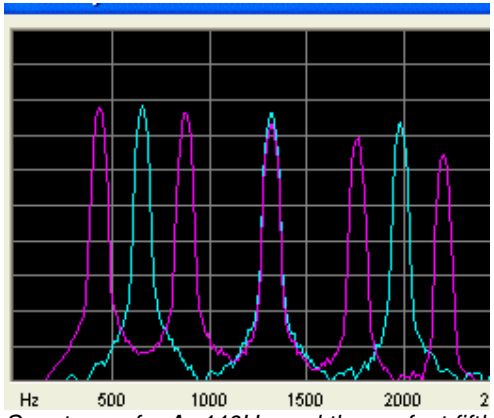
On the picture sequence you can see the two waves some times amplify each other some times they don't

"Undertones"

When I started playing I could hear the under tones also remember hearing a strong beat in the undertones when I was playing intervals, or when I played in harmony with my teacher. I asked my teacher what it was and he told me that they does not exist. Today I can not hear them, but my friends tell me they can here them and that they are very useful for tuning your violin.

The under tones are created by your ear. When the ear hears a tone it does not only make spectrum analysis it performs a cepstrum analysis as well. Spectrum analysis is finding periodicity in the time signal. Cepstrum analysis (pronounced with an initial K) is looking for peroidicity in the spectrum. The ear is trained to find the root note of a harmonic sequence. (In this way you can hear the base in the radio even if the base is played at a low frequency that is not audible through your radio loudspeaker. The ear hears the harmonic series of the base, and presumes that the root note is there.)

When two tones are played together the ear will see a harmonic series of the difference between the two tones.



*Spectrum of a A=440Hz and the perfect fifth E=660Hz. We have seen that the harmonics coincides on 3*440=2*660=1320Hz Furthermore you see that the two tones forms a harmonic series of 220Hz The root note (220hz) is missing, but the ear may add it as an undertone.*

The spectrum contains 2. 3. 4. 6. 8. and 9 harmonic of 220 Hz. Note that 5. and 7. harmonic is missing.

Pythagoras

Pythagoras scales

Pythagoras lived on the island of Samos year 560-480. He believed that everything can be formed in a rational relation.

He believed that the movements of the planets were related to music, and he started studying music for finding mathematical relations that he later transferred to the laws of the universe.

At his time a pentatonic scale was used in Greece.

A typical pentatonic scale contains the notes: C, D, E, G, A, C

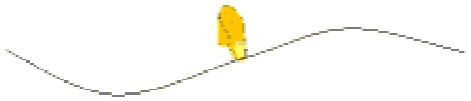
Perfect fifths

By dividing a string in 3 parts you get a fifth higher. Pythagoras took the fifth and divided it again. When you have done that five times you would get all the notes of the pentatonic scale.

The pupils of Pythagoras went on until they had formed our present 7 tone scale . C, D, E, G, A, B, C.

By continuing to put fifth on top of each other you may create a twelve tone scale.

Find the fifth by dividing the string



You may easily produce a pure octave and a pure fifth on your violin.

1. Hold the finger above the string just touching the string at about half the string.
2. Make sure to bow close to the bridge.
3. You will create a flageolet note (the word flageolet comes from French: flute, it is because the tone produced in this manner sounds a little bit like a flute) with a pitch one octave higher.
4. Try the same technique were you normally put your fourth finger. You will get a note sounding one octave and a fifth higher. The string is now divided in three equal parts.

The circle of fifths

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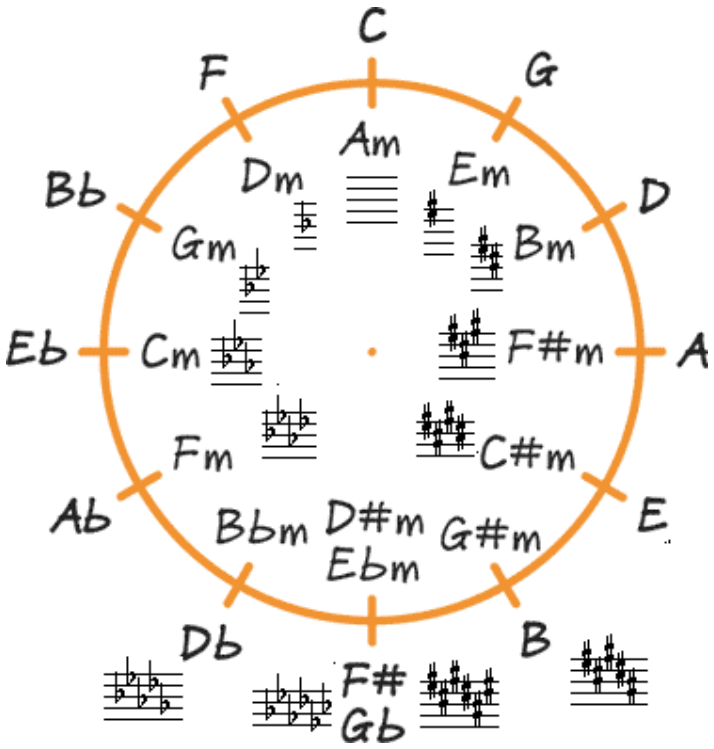
Our western scale system is partly built on Pythagoras findings. The neighboring keys in the circle are correspondingly subdominant and dominant of the key in the middle.



Tempered scale

Disadvantages of the Pythagorean and harmonic scales

The harmonic and Pythagorean scales sounds very good when you play in the in one to 3 keys, but as you start modulate into all 12 keys it does not sound very nice.

The tempered scale

In the 17th century people wanted to make pianos and organs that could play in any key. The German organ builder Andreas Werckmeister made a system where he detuned every note systematically. He listened to the beat in the fifth and correlated the same beat in all fifth. Today we use a mathematical way of deriving the tempered scale.

This allowed to play in all keys. In the beginning there was a discussion. Because the tempered organ did not sound as good as the organ tuned the Pythagorean or the harmonic way, when playing in the basic key. Johannes Sebastian Bach solved the dispute by composing a melody that modulated into all 12 keys. This could only be played on the new instruments, so all instruments had to be tuned to the new principles if you wanted to play the new music.

Today all pianos, harmonicas and synthesizers are tuned in the tempered scale. So if you are playing together with these instruments, you should play tempered

How to derive the tempered scale

The frequency is inverse proportional with the string length, so let us derive it frequency based.

The problem is to find a number that multiplied with it self 12 times yields a doubling of the frequency corresponding to an octave.

The equation looks like this

X*X*X*X*X*X*X*X*X*X*X*X=2

or

$$X^{12} = 2$$

$$X = \sqrt[12]{2}$$

X= 1.059463094 about 6% higher pitch.

In string length

this yields $\frac{1}{\sqrt[12]{2}}$ or 94,38% shorter string for each semitone.

The square root of a number is the number that multiplied with itself yields the number. The twelfth root is the number that multiplied with itself twelve times yields the number. You may get the twelfth root on a scientific calculator by taking the number to the power of 1/12th.

About the interval list

Overview| Next (to to the interval list |

The next page is using Javascript .

On the next page you will find 39 intervals

- Pure natural intervals
- Intervals of the harmonic scale
- Intervals of the Pythagorean scale
- Tempered intervals.

You will be able to listen to the tones/ intervals by either moving your mouse across them or clicking.

In the beginning you must try the notes twice. This is because it takes some time to download the wav files. Once they are downloaded they will be in your cache of your computer were they are readily available.

The scheme works best with Microsoft Internet Explorer (MS IE), but you may use it with other browsers (with slightly changed functionality.)

For users of MS IE:

There are two modes of operation

- Move the mouse across the frequencies for listening to the tones.
- Click on the interval name, and you will here the root note (A=440 Hz) while the mouse is down, and the selected note on top of it when the mouse is up.

I admit it is confusing but it its quite smart once you have learnt to use it.

The interval link

First you hear the root, then you will hear the interval. The longer you keep the mouse down, the longer the distance between the two tones.

On the frequency link

Don't click on the frequency links. It is enough to move the mouse across. This allows you to fast move the mouse across several tones to hear them together.

Interval oversigt

Oversigt | Navne

Interval	Relativ Strengelængde		Forskel i cent	Intervalstørrelse i Cent	A-dur	Frekvens (Grundtone A)	Frekvens oktaven under
					Ren G-streng		196,55
Samme tone (Prim)					Tempereret G-streng		196,9977
Prim tone (Rein)	1:1	1			A	440	220
Diatonisk komma	80 : 81	0,9877	22	22	A	445,5	222,75
Pythagoræisk komma	524288 : 531441	0,9865	24	24	Gisiss	446,803	223,8015
Halvtone							
Pythagoræisk halvtone (limma)	243 : 256	0,9492	-90	90	B (Bb)	463,5391	231,7695
Halvtone Tempereret	$1:\sqrt[12]{2}$	0,9439	-	100	B (Bb) / Ais	466,1638	233,0819
Kromatisk halvtone Pythagoræisk	2048 : 2187	0,9364	14	114	Ais	469,8633	234,9316
Forminsket tertz Pythagoræisk	59049 : 65536	0,901	-20	180	Cessess	488,3325	244,1662
Heltone							
Helttone lille Hammerskt	8 : 9	0,9	-18	182	H (B)	498,8889	244,4444
Helttone Tempereret	$1:\sqrt[6]{2}$	0,8909		200	H (B)	493,8833	246,9417
Helttone Stor - Hammerskt (Pythagoræisk)	9 : 8	0,8889	4	204	H (B)	495	247,5
Lille Terts							
Lille tertz Pythagoræisk	27 : 32	0,8436	-6	294	C	527,4375	263,7187
Lille tertz Tempereret	$1:\left(\sqrt[4]{2}\right)^3$	0,8409	-	300	C	525,2551	262,6256

MSIE: Click on interval name

Other browsers
No action

On the frequency

MSIE: Move the mouse over the tone (don't click - clicking will open the tone in your player you don't want that)

Other browsers Click on the frequency and the tone will open in your player

For users of other browser

You can only click on the frequencies, and the tone will open in your player.

Interval Overview

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Interval	Relative string length		Difference in cents	Intervalstørrelse i Cent	A-dur	Frequency (A=440 Hz base)	One octave below
.					Pure G streng		195,55
Same note (Unisone)					Tempered G-string		195,9977
Unison	1:1	1			A	440	220
Comma of Dydimusous	80 : 81	0,9877	22	22	A	445,5	222,75
Comma of Pythagoras	524288 : 531441	0,9865	24	24	G##	446,003	223,0015
Half tone							
Leadtone Pythagoreic	243 : 256	0,9492	-10	90	Bb	463,5391	231,7695
Semitone Tempered	$1 : \sqrt[12]{2}$	0,9439	-	100	Bb / A#	466,1638	233,0819
Semitone Pythagorian	2048 : 2187	0,9364	14	114	A#	469,8633	234,9316
Diminished triad: Pythagorian	59049 : 65536	0,901	-20	180	Cbb	488,3375	244,1687
Whole tone							
Smaller step minor tone	9 : 10	0,9	-18	182	B	488,8889	244,4444
Tempered half tone	$1 : \sqrt[6]{2}$	0,8909	-	200	B	493,8833	246,9417
Greater step maior	8 : 9	0,8889	4	204	B	495	247,5

tone tone							
Minor third							
Minor Third : Pythagorian	27 : 32	0,8438	-6	294	C	521,4815	260,7407
Minor third: Tempered	$1 : \left(\sqrt[12]{2}\right)^3$	0,8409	-	300	C	523,2511	261,6256
Minor third: Natural	5 : 6	0,8333	16	316	C	528	264
Major Third							
Major third : Natural	4 : 5	0,8	-14	386	C#	550	275
Major third: Tempered	$1 : \sqrt[3]{2}$	0,7937	-	400	C#	554,3653	277,1826
Major third : Pythagorian	64 : 81	0,7901	8	408	C#	556,875	278,4375
Fourth							
Perfect Forth. Natural	3 : 4	0,75	-2	498	D	586,6667	293,3333
Fourth: Temperered	$1 : \left(\sqrt[12]{2}\right)^5$	0,7492	-	500	D	587,3295	293,6648
Tritone							
Diminished Fifth : Pythagorian	729 : 1024	0,7119	-17	583	Eb	618,0521	309,0261
Diminished Fifth : Natural	5 : 7	0,7143	-12	588	Eb	616	308
Tritone : tempered	$1 : \sqrt{2}$	0,7071	-	600	D#/Eb	622,254	311,127
Tritone : Pythagorian	512 : 729	0,7023	12	612	D#	626,4844	313,2422
Tritonus : Naturlig overstigende kvart	7 : 10	0,7	17	617	D#	628,5714	314,2857
Kvint							

Kvint: Tempered	$1:\left(\sqrt[12]{2}\right)^{7}$	0,6674	-	700	E	659,2551	329,6276
Kvint: Naturlig og Pythagorian	2 : 3	0,6667	2	702	E	660	330
Minor Sixth							
Minor Sixth : Pythagorian	81 : 128	0,6328	-8	792	F	695,3086	347,6543
Minor Sixth: Tempered	$1:\left(\sqrt[3]{2}\right)^{2}$	0,63	-	800	F	698,4565	349,2282
Minor Sixth : Harmonisk	5 : 8	0,625	14	814	F	704	352
Major Sixth							
Major Sixth : Harmonisk	3 : 5		-16	884	F#	733,3333	366,6667
Major Sixth : Tempered	$1:\left(\sqrt[4]{2}\right)^{3}$	0,5946	-	900	F#	739,9888	369,9944
Major Sixth : Pythagorian	16 : 27	0,5926	6	906	F#	742,5	371,25
Minor septim							
Minor septim : Naturtone	4 : 7	0,5714	-31	969	G	770	385
Minor septim: Harmonisk	5 : 9	0,5556	22	1022	G	792	396
Minor septim : Pythagorian	9 : 16	0,5625	-4	996	G	782,2222	391,1111
Minor Seventh : Tempered	$1:\left(\sqrt[6]{2}\right)^{5}$	0,5612	-	1000	G	783,9909	391,9954
Major Septim							
Harmonic Seventh	8 : 15	0,5333	-11	1089	G#	825	412,5

Major Seventh : Tempered	$1 : \left(\sqrt[12]{2}\right)^{11}$	0,5297	-	1100	G#	830,6094	415,3047
Major Seventh :x Pythagorean	128 : 243	0,5267	10	1110	G#	835,3125	417,6562
Octave							

kilde: Svensson, Sven E - Noreen, Erik: BONNIERS ILLUSTRERADE MUSIKLEXIKON , Stockholm 1946

More about intervals

Overview

Conclusion

There are different scales

- Pentatonic used by aboriginal people around the world.
- Pythagorean made 400 years BC and was used until end of the 17th century.
- The harmonic which fits best physically to how we are experiencing music
- The tempered scale used in our western civilization today

And how can we use this knowledge.

When you are playing violin alone you will most likely try to intone to the harmonic scale. This is the scale that sounds best. When you play harmonic intervals the resonance of the other strings will guide you that you are playing in tune. Beware of the seventh though. The harmonic minor and major seventh are quite far away from the tempered, and many people will feel that you are playing out of tune if you use the harmonics.

When you play together with other instruments you must play according to the tempered scale. The difference is quite small for most notes, but not for all!

Names of interval

Interval name	**unison**	**half tone**	**whole tone**	**minor third**	**major third**	**fourth**	**tritone**	**fifth**	**minor sixth**	**major sixth**	**minor seventh**	**major seventh**	**octave**
half note	0	1	2	3	4	5	6	7	8	9	10	11	12
Tone in C-major	C	C#	D	Eb	E	F	F#	G	Ab	A	Bb	B	C
Tone in D-major	D	D#	E	F	F#	G	G#	A	Bb	B	C	C#	D
Tone in A-major	A	A#	B	C	C#	D	D#	E	F	F#	G	G#	A