

Foundations of Modern Cello Technique

Preparatory Exercises

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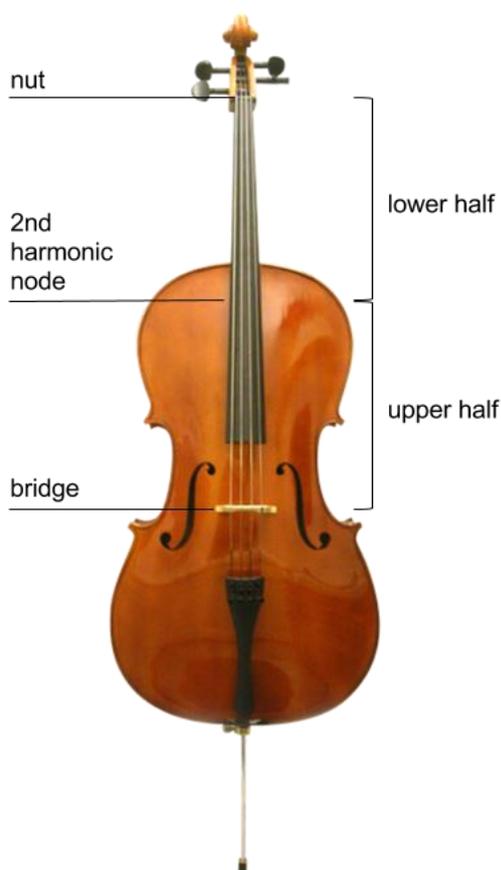
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Exercise 1: Harmonics 1-16 (upper half of the string)

Play all of these notes by lightly placing the left-hand second finger at the pitch indicated by the diamond note-head. Play at a *mezzo forte* dynamic, taking care that the bow moves closer to the bridge as the notes get higher in pitch. All of these harmonics sound at the same pitch as indicated by the note-head.

The image displays four musical staves, each representing a different string on a violin: A-String, D-String, G-String, and C-String. Each staff is numbered 1 through 16, corresponding to the 16 harmonics. The notes are represented by diamond-shaped note heads. Arrows point to specific notes, indicating where the left-hand second finger should be placed. A dashed line labeled '8va' (octave) is drawn above the notes on each staff, indicating that the notes are to be played an octave higher than written. The A-String staff uses a treble clef, while the D, G, and C strings use bass clefs. The notes are arranged in a sequence that covers the upper half of the string's length.

Exercise 2: Harmonics 1-16 (all nodes)

Play the following in two ways:

- Begin by playing the last bar of each line – this is the last node of each harmonic, which sounds at pitch, as seen in Exercise 1. Take note of the bow placement and maintain it while playing the other nodes of the same harmonic.
- Play the last bars of each line sequentially (upper half of the string), followed by the first bars of each line (lower half of the string), in order to feel the increasingly small distances between the nodes. This is an important aspect of understanding the geography of the harmonics on the string. The first nodes of the 10th-15th harmonics have very slight deviations in finger placement, by less than an eighth-tone. These have been indicated in cents which in this case, as with the arrows, serve only as approximate indication of finger placement. Special attention should be given to aural recognition of pitch placement when familiarizing oneself with the upper harmonic, as these will not correspond to the notes of the diatonic scale.

A-String

2nd harmonic



1/2

3rd harmonic



1/3 2/3

4th harmonic



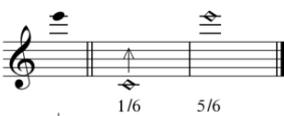
1/4 3/4

5th harmonic



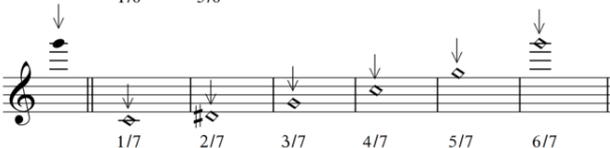
1/5 2/5 3/5 4/5

6th harmonic



1/6 5/6

7th harmonic



1/7 2/7 3/7 4/7 5/7 6/7

8th harmonic



1/8 3/8 5/8 7/8

9th harmonic



1/9 2/9 4/9 5/9 7/9 8/9

10th harmonic

1/10 3/10 7/10 9/10

11th harmonic

1/11 2/11 3/11 4/11 5/11 6/11 7/11 8/11 9/11 10/11

12th harmonic

1/12 5/12 7/12 11/12

13th harmonic

1/13 2/13 3/13 4/13 5/13 6/13 7/13 8/13 9/13 10/13 11/13 12/13

14th harmonic

1/14 3/14 5/14 9/14 11/14 13/14

15th harmonic

1/15 2/15 4/15 7/15 8/15 11/15 13/15 14/15

16th harmonic

1/16 3/16 5/16 7/16 9/16 11/16 13/16 15/16

Exercise 3: Stopped Harmonics

The upper staff indicates the sounding pitch – note that the resulting sounds are the same for each of the lowest four lines below. Play the following three ways:

- The fundamental (the lowest note in each example below) is first played with the thumb and the diamond note-head is lightly touched with the 3rd finger.
- Repeat the exercise using the 1st finger on the fundamental and the 4th finger on the harmonic.
- The scales can all be played either staying on one string or over two strings, as indicated on the second and third lines.

II -----

stopped 4th harmonics
0 (0)
II ----- I -----
II -----

stopped 5th harmonics
II ----- I -----
II -----

stopped major-3rd harmonics
III

stopped minor-3rd harmonics

Exercise 4: Double-node Harmonics

Begin by playing the sounding pitch, notated at the beginning of the line. Use the harmonic rather than the stopped note so that the intonation is precise. Then play each double-node by lightly touching both harmonics on the same string to obtain the same pitch. Remember that finger spacing will remain constant for all the double-nodes on the same line.

[A-String]

5th harmonic

6th harmonic

7th harmonic

8th harmonic

9th harmonic

10th harmonic

11th harmonic

12th harmonic

13th harmonic

14th harmonic

15th harmonic

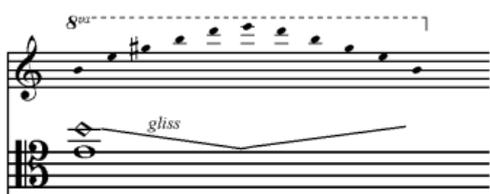
16th harmonic

Exercise 5: Natural Harmonics Glissando

Keeping the bow close to the bridge, glissando along the whole string from the nut to the end of the fingerboard, which will create a descending and ascending line (the 2nd harmonic, or middle, as the lowest point in the register). The left hand should start slowly, accelerating as it reaches the middle of the string, and then slowing down again as it gets further away from the middle.

Exercise 6: Natural Harmonics Glissando over a Stopped Note

Play the following several times to increase flexibility and strengthen the muscles inside the hand:



Exercise 7: Finger Dexterity in Pizzicato

The use of *p* (thumb), *i* (1st finger), *m* (2nd finger), and *a* (3rd finger) to label the fingers of the right hand is borrowed from the guitarist's terminology.

Allegro non troppo
sempre pizz.

p i m a m i

Allegro

p i m i

Exercise 8: Overtone Exclusion

- a) Find the 2nd harmonic.
 - b) Pluck the string exactly at this point, this 2nd harmonic should be completely absent from the sound but the fundamental should be very loud.
 - c) Pluck the string at the mid-point between this harmonic node and the bridge (or, at the 3rd harmonic node), the 2nd harmonic should be very prominent in the sound as the 3rd harmonic is its antinode.
-

Exercise 9: Plectrum Width

Try these possible combinations, at varying distances:

- a) R.H. 1st and 2nd fingers, in the same direction
 - b) R.H. thumb and 3rd finger, in the opposite direction
 - c) L.H. 3rd finger and R.H. 1st finger, in the same direction
 - d) L.H. 3rd finger and R.H. 1st finger, in the opposite direction
-

Exercise 10: Voicing in Pizzicato Chords

- a) Play all four notes simultaneously, using the thumb and different fingers for each note. Begin by making each red note a Bartók pizzicato, taking care that the other notes are not.
- b) Then make the voicing more subtle by eliminating the snap and simply making the red notes louder than the others.



Exercise 11: Enharmonic / Timbre Trills

Play the following trills and then find more combinations elsewhere on your instrument.

- a) Two nodes of the same harmonic (same string). This can be played either as a keyboard trill or a traditional trill to exploit the double-node.



- b) The highest node of a harmonic and the fully stopped pitch at the same placement (same string).



- c) Two natural harmonics which produce the same pitch (different strings).



- d) Two stopped harmonics which produce the same pitch (different strings).



- e) A natural harmonic and a stopped harmonic which produce the same pitch (different strings).



Exercise 12: Bi-tones vs. Strike Tones

- a) Placing the bow firmly on the string, pluck the string on either side of the bow to hear the pitches.
 - b) Carefully maintaining the same point of contact, hit the string with the bow but don't lift the bow afterwards, keep it on the string. Listen for the two notes you just plucked.
 - c) Now still with the same point of bow contact, hit the string but let it bounce back away from the string: you should hear the open string and the pitch of the portion of string between the bow and the bridge.
-

Exercise 13: Widening the Hammer

Notice the slight difference in sound between col legno at the middle of the stick, and using the flat side of the tip of the bow (the largest available surface of wood on the bow). Observe whether this produces a stronger or weaker strike tone in relation to the primary tone.

Using two bows for col legno, observe the reduction in overtone content but the increase in volume. Repeat with various distances between the two bows. If the bow closest to the bridge stays at the same point of contact, there should be no variation in the pitch of the strike tone.

Exercise 14: Strike Tones Melodic Contour

Both staves are played entirely on the A-string. The lower staff shows the fingered pitches (primary tones), and the upper staff shows the hammer's point of contact on the string, which are also the pitches of the resulting strike tones.

- a) First play the upper staff *arco* to hear the notated pitches.
- b) Then, to hear the strike tones alone, place the palm of the hand over the strings to damp them and hit the string with the wood of the bow where the left hand would ordinarily be to stop the pitches.
- c) Play the exercise as written.

The musical score for Exercise 14 is presented in three systems, each consisting of a treble and a bass staff. The time signature is 4/4. The first system is labeled "oblique" and shows a treble staff with a sequence of notes: G4, A4, B4, C5, D5, E5, F5, G5, A5, B5, C6, D6, E6, F6, G6, A6, B6, C7, D7, E7, F7, G7, A7, B7, C8, D8, E8, F8, G8, A8, B8, C9, D9, E9, F9, G9, A9, B9, C10, D10, E10, F10, G10, A10, B10, C11, D11, E11, F11, G11, A11, B11, C12, D12, E12, F12, G12, A12, B12, C13, D13, E13, F13, G13, A13, B13, C14, D14, E14, F14, G14, A14, B14, C15, D15, E15, F15, G15, A15, B15, C16, D16, E16, F16, G16, A16, B16, C17, D17, E17, F17, G17, A17, B17, C18, D18, E18, F18, G18, A18, B18, C19, D19, E19, F19, G19, A19, B19, C20, D20, E20, F20, G20, A20, B20, C21, D21, E21, F21, G21, A21, B21, C22, D22, E22, F22, G22, A22, B22, C23, D23, E23, F23, G23, A23, B23, C24, D24, E24, F24, G24, A24, B24, C25, D25, E25, F25, G25, A25, B25, C26, D26, E26, F26, G26, A26, B26, C27, D27, E27, F27, G27, A27, B27, C28, D28, E28, F28, G28, A28, B28, C29, D29, E29, F29, G29, A29, B29, C30, D30, E30, F30, G30, A30, B30, C31, D31, E31, F31, G31, A31, B31, C32, D32, E32, F32, G32, A32, B32, C33, D33, E33, F33, G33, A33, B33, C34, D34, E34, F34, G34, A34, B34, C35, D35, E35, F35, G35, A35, B35, C36, D36, E36, F36, G36, A36, B36, C37, D37, E37, F37, G37, A37, B37, C38, D38, E38, F38, G38, A38, B38, C39, D39, E39, F39, G39, A39, B39, C40, D40, E40, F40, G40, A40, B40, C41, D41, E41, F41, G41, A41, B41, C42, D42, E42, F42, G42, A42, B42, C43, D43, E43, F43, G43, A43, B43, C44, D44, E44, F44, G44, A44, B44, C45, D45, E45, F45, G45, A45, B45, C46, D46, E46, F46, G46, A46, B46, C47, D47, E47, F47, G47, A47, B47, C48, D48, E48, F48, G48, A48, B48, C49, D49, E49, F49, G49, A49, B49, C50, D50, E50, F50, G50, A50, B50, C51, D51, E51, F51, G51, A51, B51, C52, D52, E52, F52, G52, A52, B52, C53, D53, E53, F53, G53, A53, B53, C54, D54, E54, F54, G54, A54, B54, C55, D55, E55, F55, G55, A55, B55, C56, D56, E56, F56, G56, A56, B56, C57, D57, E57, F57, G57, A57, B57, C58, D58, E58, F58, G58, A58, B58, C59, D59, E59, F59, G59, A59, B59, C60, D60, 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Exercise 15: Finding a Multiphonic

- Play the four harmonics, the resulting pitches are notated on the upper staff (these are the constituents of the multiphonic).
- Play the highest sounding of these four harmonics, in this case the 3rd node of the 11th harmonic. Use light left-hand pressure, and a slower bow stroke with higher pressure and closer to the bridge.
- To find the same multiphonic on the upper half of the string, first play the next four harmonics then follow the same instructions for the multiphonic.

1/3 2/7 3/11 1/4 I [4+11+7+3] 2/3 5/7 8/11 3/4 I [3+7+11+4]

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Exercise 16: Turning the Peg

Cellists are generally less experienced at tuning with their pegs than violinists. The pegs may be stiff at first; if so ask your nearest violinist or violist for some peg paste! Always remember to push inwards while you turn.

- First retune the string during the rest, using the left hand to turn the peg. Aim to change your playing position as little as possible.
- Then retune while playing, focusing on maintaining a steady bow stroke.

retune retune retune *sim.*

retune retune retune *sim.*

