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Coláiste na hOllscoile Corcaigh

W. Hollas Longton

Ancillary Works 2012-2015

Bint

for Cornelis de Bondt

Hollas Longton

Duration: 5’

- This piece was composed as an homage to Cornelis de Bondt's famous 'Bint'. Like 'Bint' it contains two voices (symbolized by the pitches C and D) which drift against one another.

- No vibrato.

- All accents should be quite marked, with the unaccented notes being at a lower dynamic level, yet still fully articulated.

- Because this piece contains rhythmic drifting, it is very important that the tempo (♩. = 140) remains constant.

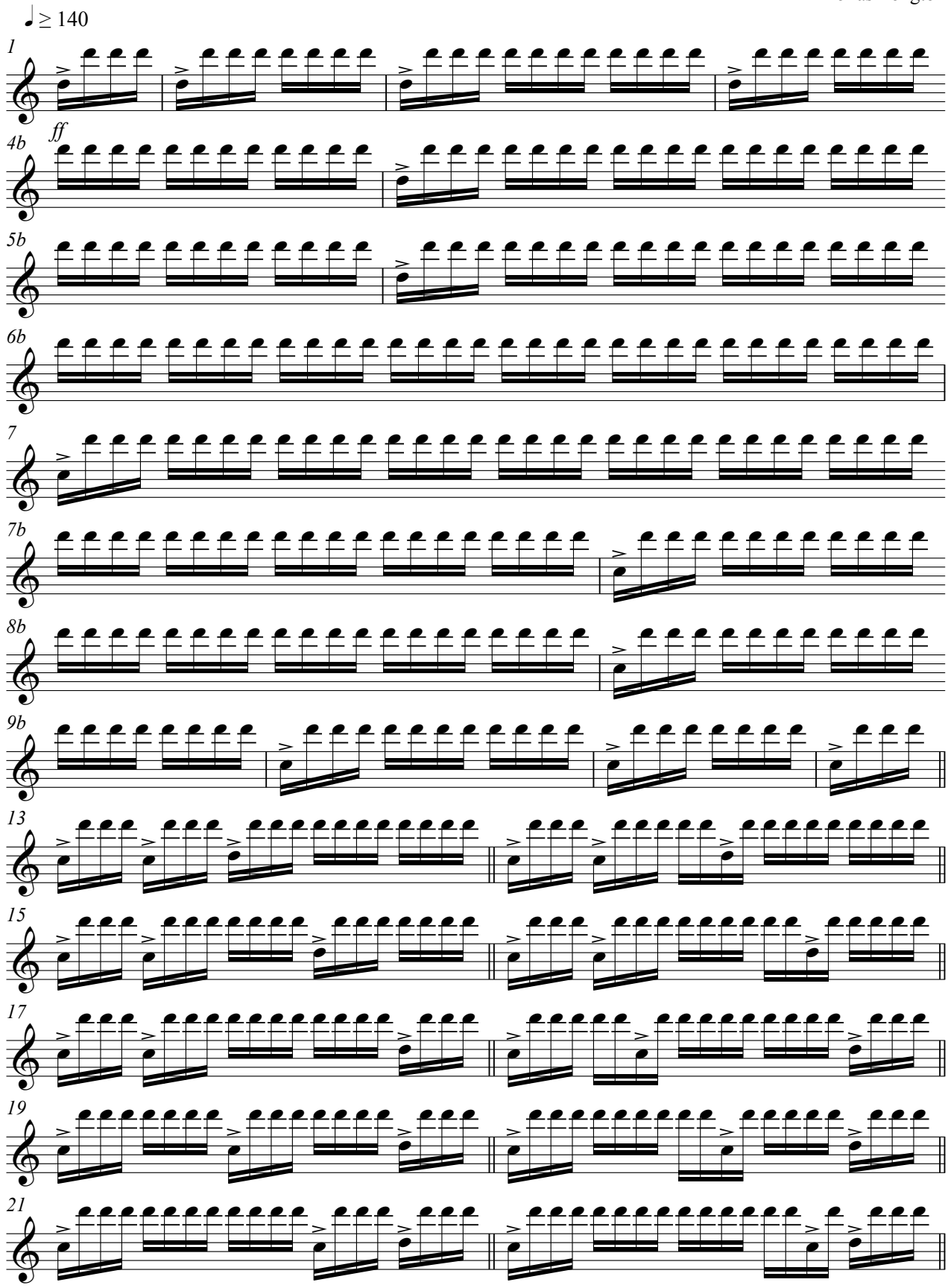
- After rehearsal mark 'A' each bar is to be repeated as many times as the performer wishes (except those marked otherwise). Playing bars without repeating is also acceptable. I would caution against repeating a bar more than six times.

- While the performer is free to choose both the tempo and the number of repeats per bar, the length of the piece should be around five minutes.

Bint

for Cornelis de Bondt

Hollas Longton




23
25
27
29
do not repeat
31b
34
36
37b
39b
41b
42b
44b
do not repeat
45b

Just Intonation Method for Violin

Hollas Longton

‘Tartini Tones’

Difference tones are commonly known to violinists as 'Tartini tones' after the violinist Giuseppe Tartini who popularized their discovery on his instrument. They are audible tones created from the difference between two simultaneous tones. For example, a chord which has a tuning ratio of 9:7 has the difference tone of 2, because 9 - 7 = 2. In my estimation difference tones are the greatest aid string players have in learning to play in just intonation, as they act as an audible guide with which to tune. A working knowledge of difference tones is indispensable to the execution of just intervals. If you can understand what the difference tone of an interval should be, then you should be able to tune your interval until you are able to hear it.

As a general rule, the more exotic an interval is (the higher the numbers in the ratio) the harder it will be to tune. This is because the difference tone of an exotic interval can very quickly fall below the range of human hearing (e.g. if a chord with a tuning ratio of 73:71 lies within an easily audible range, the difference tone of 2 (73 - 71 = 2) will lie 5 and a bit octaves below it). In this case, the difference tone will be heard as a beating frequency rather than a pitch. Beating frequencies can also be used to tune exotic intervals, although this requires the counting and measuring of this beating frequency rather than tuning a pitch. In this case summation tones (the sum of two pitches) may be used to aid the tuning of this kind of interval. An awareness of what stable higher resulting harmonics are present as a result of an interval (usually a summation tone) can be used in conjunction with beating frequencies to tune intervals whose difference tone lies below the range of human hearing.

Introduction

I must thank Marc Sabat for his work in this area, which has served as a foundation for my own. Sabat's work, along with Wolfgang Schneiderhan and the Plainsound group created a new notation system for dealing with just intonation. This notation is based on a sequence of just fifths starting on the violin's A-string, and so is in some ways ideally suited for string players. However, my own desire in this field is to not to write in any mode or system, and to have no imaginary grid onto which the pitches are placed.

Instead of outlining a larger set of possible intervals using extra accidentals, this short collection of scales and studies aims to begin the development of the violinist's ear to hear not only difference tones but also beating frequencies and summation tones. While these pages of material still use a limited number of intervals, through diligent practice and patience a potentially infinite number of just intervals should become possible.

It is important to recognize the importance of the relatively intangible aspects of string instrument tuning in the fine tuning process. The typical string player can often 'feel' when an interval is in tune more than they can hear it. This feeling is a resonance (an inaudibly low difference tone) in the body of the violin which is transferred to the body of the player. Other times, the player may hear an extremely high summation tone as a stable element in the sound, which they may not be able to identify. The ability to recognize these acoustic artifacts either theoretically or viscerally requires both patience and practice.

The materials I have provided only comprises a footnote in the field of just intonation exercises. Upon mastering all of the material provided, the violinist is invited to seek out and explore even more exotic and unfamiliar tuning ratios, chords, scales. It is my firm belief that any tuning is possible as long as you have a way of listening for it. It is my hope that these materials provide the violinist with a foundation upon which to build their ears and expand their technique.

General Instructions:

- No vibrato.

- Open strings where marked.

- Numbers above noteheads indicate deviations from the equal-tempered scale. One cent equals 1/100th of a semitone (1200 cents equals one octave).

- For practice tuners with cent deviation readout may be extremely useful (especially in the ‘Exercises in Just Intonation’).

- Noteheads in parentheses are optional.

- Mutes of any kind may be used at any time to help the violinist to hear acoustic artifacts.

- A guitar distortion pedal may be used to help the violinist to hear difference tones.

- Violins are to be tuned as a series of just fifths (cent deviations as follows):

IV	III	II	I
-4	-2	0	+2

All of these exercises should be played extremely slowly. You may increase the tempo only after the tuning is not only consistent, but also after the audibility of difference tones, summation tones, and beatings becomes clear and easy. The violinist(s) may move to the next pitch only after these acoustic artifacts are heard and are stable. In the 'Exercises in Just Intonation' the bottom stave is always understood to be an assistant to the top stave and may be present or omitted at any time.

The first exercise the violinist should undertake is to slide the finger very slowly up and down the string in the ranges indicated. With each slide up and down, the violinist should slide the finger slower. This process should be repeated until the slide is extremely slow and the violinist can hear difference tones, summation tones, or beatings occurring constantly. The goal of this exercise is to create an awareness of the acoustic properties of the sound which normally go unnoticed. This exercise also aims to show the infinite gradations of pitch available within the extremely small space of the violin fingerboard.

‘I: Scales in Just Intervals’

The scales which follow are primarily designed to aid the ears rather than the fingers. They outline the set of nine just intervals which can reasonably be heard and tuned by ear. The just intervals used in these scales are as follows:

Octave	(8ve)	(2:1)	(1200 cents)
minor 7th	(m7)	(7:4)	(969 cents)
Major 6th	(M6)	(5:3)	(884 cents)
minor 6th	(m6)	(8:5)	(814 cents)
Perfect 5th	(P5)	(3:2)	(702 cents)
Perfect 4th	(P4)	(4:3)	(498 cents)
Major 3rd	(M3)	(5:4)	(386 cents)
minor 3rd	(m3)	(6:5)	(316 cents)
+Major 2nd	(+M2)	(8:7)	(231 cents)
Major 2nd	(M2)	(9:8)	(204 cents)

- The bottom stave indicates the resulting difference tones, some of which are easily audible, while others will be felt rather than explicitly heard. If need be, a second string instrument may play the bottom stave. When the pitch indicated on the second stave falls below the playing range of your instrument, it may be transposed up. The violinist may use a guitar distortion pedal to aid their hearing of these difference tones.

‘II: Exercises in Just Intonation’

The 'Exercises in Just Intonation' comprise a series of chords built from this set of nine just intervals. Some of these chords will already be familiar to you while others will beat heavily or otherwise sound extremely unfamiliar and exotic. There are sometimes multiple interval combinations which result in the same final pitch.

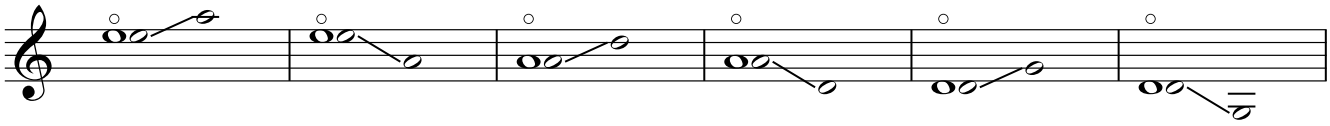
- Some of these exercises contain glissandi from one cent deviation to another. These are used to show the transition and difference between different tunings of the same pitch. These glissandi should be done extremely slowly.

Just Intonation Method for Violin

I: Scales in Just Intervals

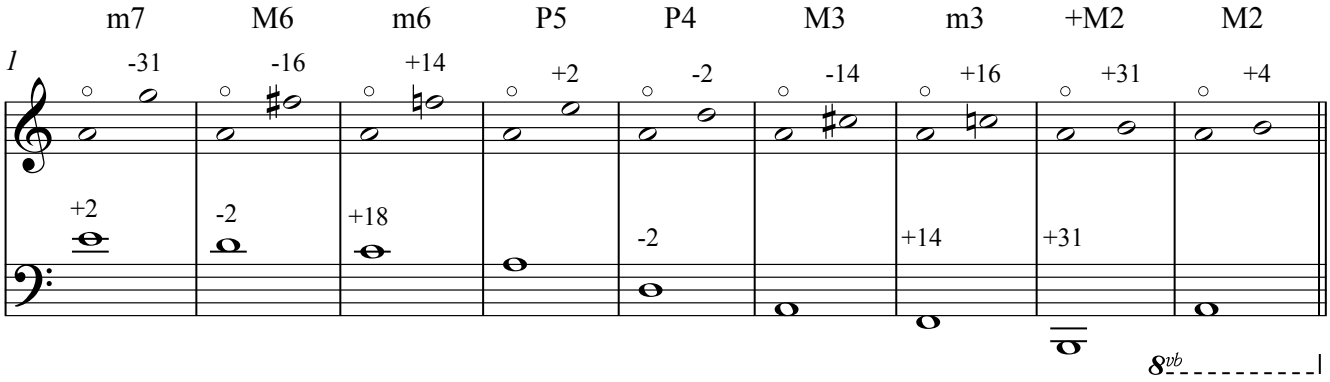
Hollas Longton

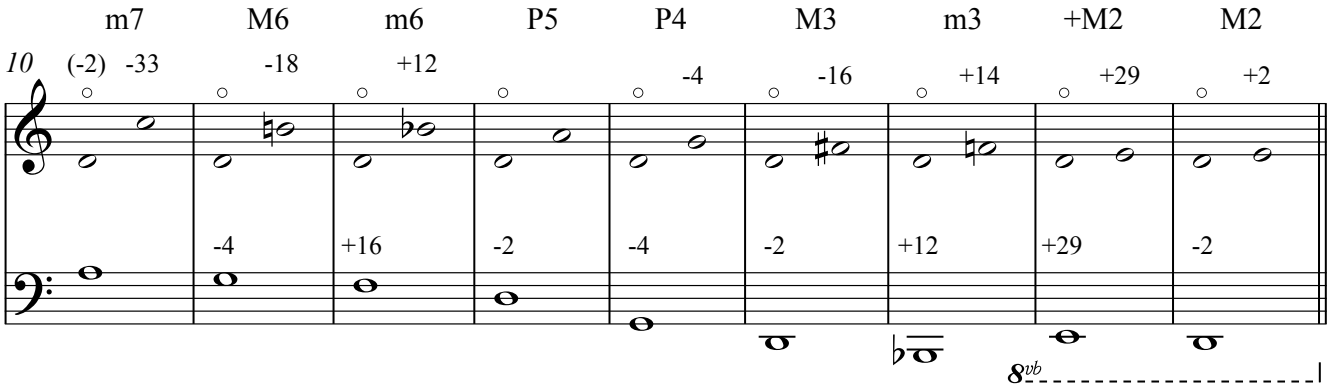
Begin sliding slowly back and forth within the given ranges. Listen carefully for difference tones.

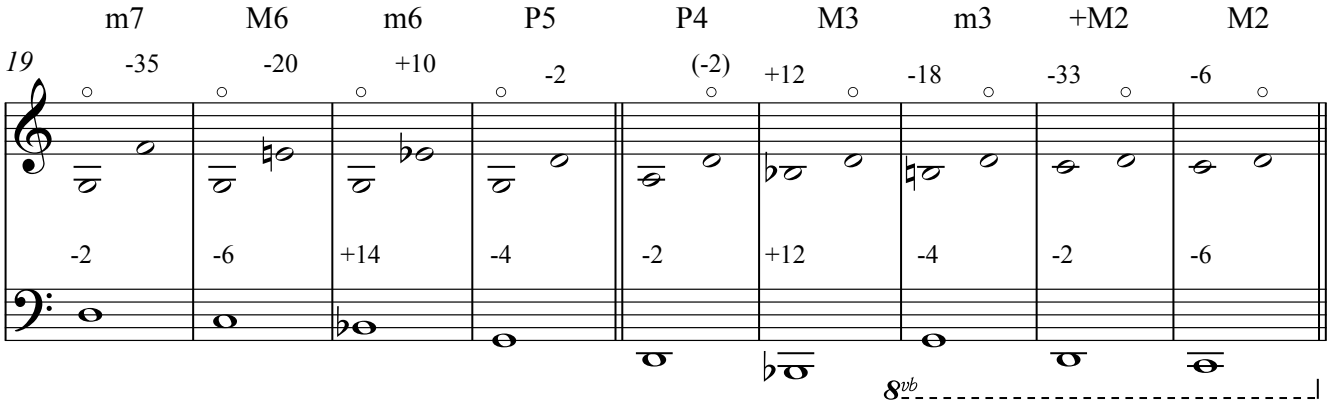


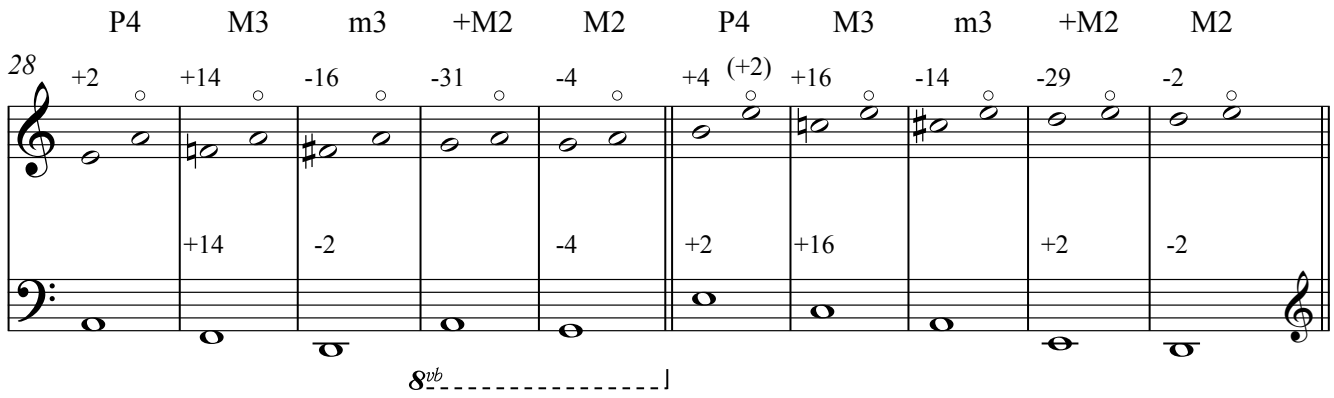
Play top stave as chords with open strings (open strings for intervals P4 to M2 are optionally fingered)

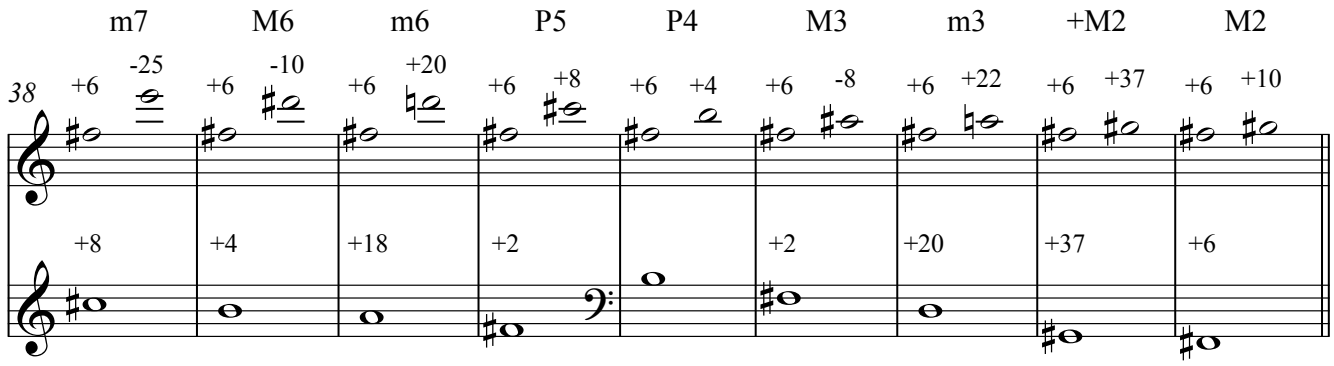
Bottom stave shows difference tones (optionally played by another string instrument)

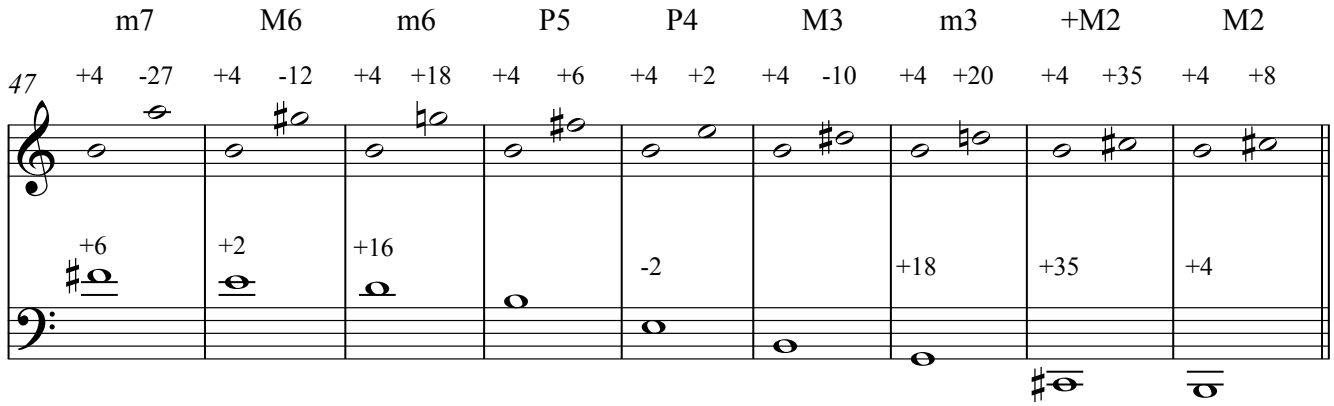


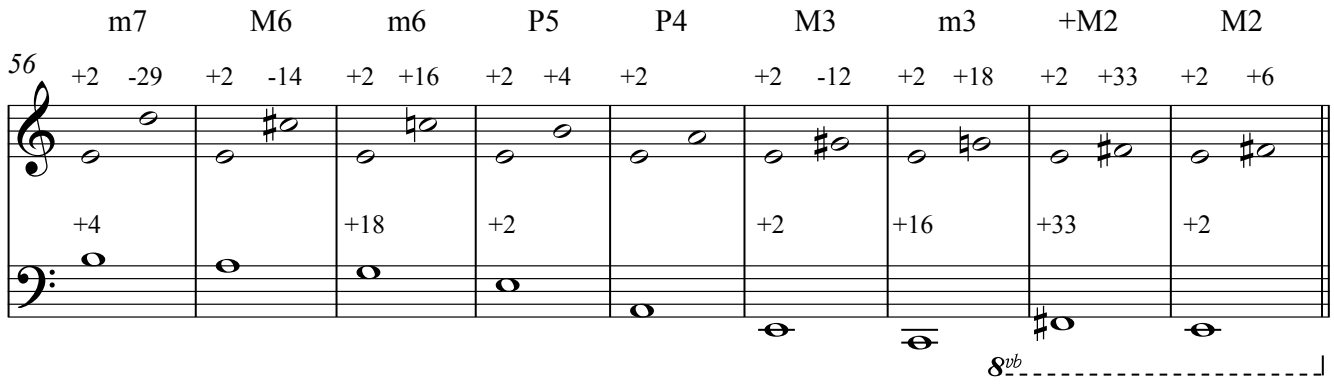


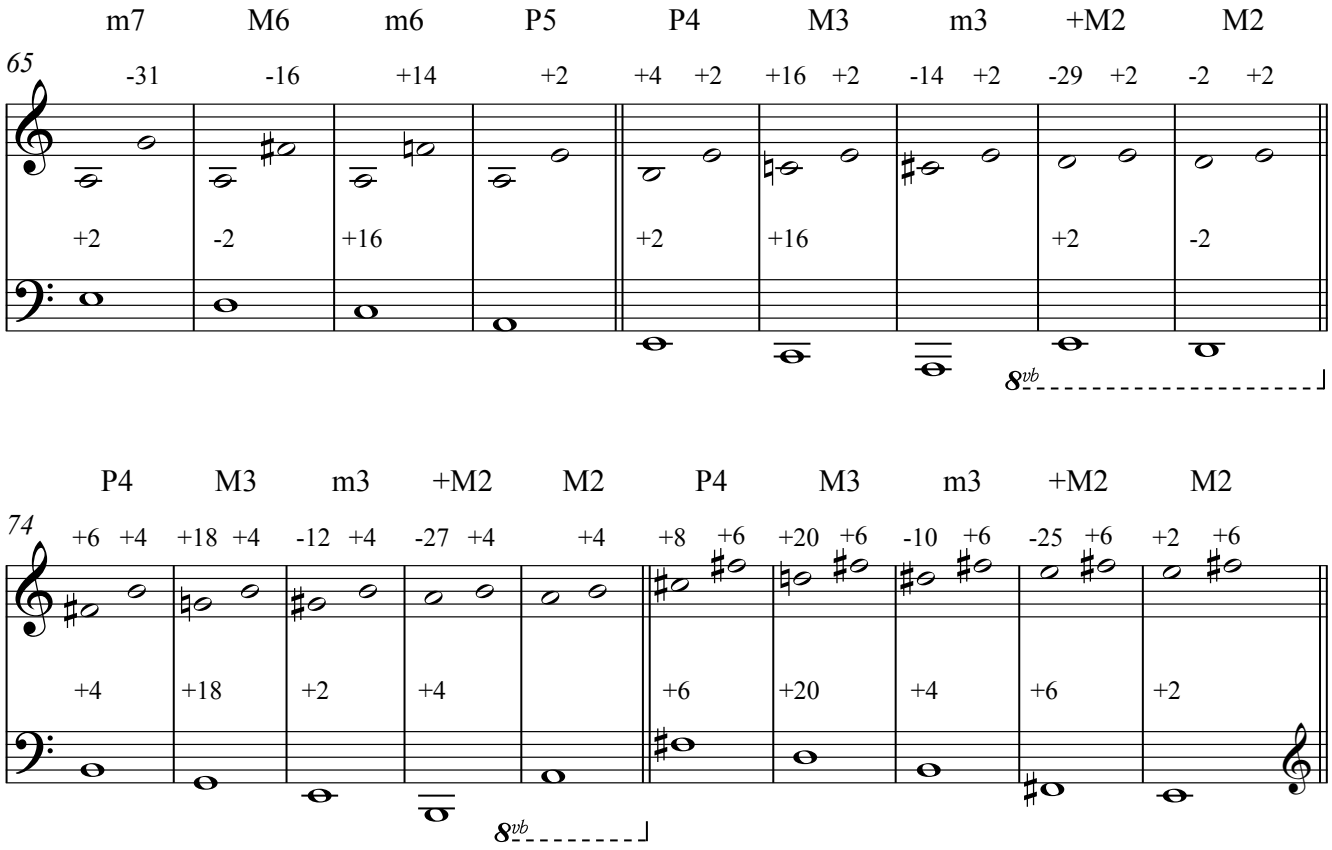



P4 M3 m3 +M2 M2 P4 M3 m3 +M2 M2
28
+2 +14 -16 -31 -4 +4 (+2) +16 -14 -29 -2
+14 -2 -4 +2 +16 +2 -2
8vb


m7 M6 m6 P5 P4 M3 m3 +M2 M2
38
+6 -25 +6 -10 +6 +20 +6 +8 +6 +4 +6 -8 +6 +22 +6 +37 +6 +10
+8 +4 +18 +2 +2 +20 +37 +6


m7 M6 m6 P5 P4 M3 m3 +M2 M2
47
+4 -27 +4 -12 +4 +18 +4 +6 +4 +2 +4 -10 +4 +20 +4 +35 +4 +8
+6 +2 +16 -2 +18 +35 +4


m7 M6 m6 P5 P4 M3 m3 +M2 M2
56
+2 -29 +2 -14 +2 +16 +2 +4 +2 +2 -12 +2 +18 +2 +33 +2 +6
+4 +18 +2 +2 +16 +33 +2
8vb



II: Exercises in Just Intonation

for two violins

These exercises use the just intervals from before and links them together in different ways. Some of these linkages will produce strange dissonances called 'commas' when combined with the pitch of Violin II. Use your knowledge of difference tones to help you find the intervals one at a time.




11
+2 -2 -29 +2 +16 -33 +2 +2 +4 -18 +2
+2 -2 -2 -2
Major 9ths
14
+2 +4 +4 -16 -18 -2 -18 -14 -45
8ves
18
+18 +4 +2 +0 -2 +0 -16 +0
+16
22
+14 +0 -14 +0 +16 +0 +4 -27
Major 7ths
26
-28 -42 +14 +0 -14 -12 +2 -12
-14 +16
Minor 7ths
30
+2 +18 -2 -4 +16 +18 +2 -10 -24
+4


34
+2 -29 -27
-16 -47 -31
+14 +16 +18
Major 6ths
37
-14 -45 -59
+16 -15 +54
+16 +18 +4 -10 -24
+4
-2 -16
41
-14 -12
+4 +6
-29 -43
-32 -16
-16
Minor 6ths
45
-17 -1
-2 -18
-14 -28
+16 +14
+14
5ths
49
+4 +20 +36
-31 -62
-31 -47
-16 -47
-31
-31
Augmented 4ths
53
+2 +4 -10
+14 -17
-16 -32
-4 -10
+4
(-4)

Oesterle Melody

for Michael Oesterle

Hollas Longton

This piece was composed as an homage to Michael Oesterle. In particular, it references his 'L'hiver Monastique'. However, whereas 'L'hiver Monastique' is described by the composer as 'an uninterrupted line, one long breath', this piece is more frenetic and fractured.

- No vibrato.

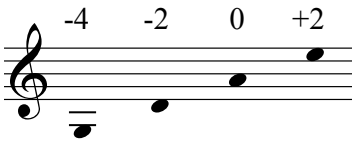
- Strings are specified using roman numerals I - IV where IV is the G-string and I is the E-string.

- Dynamic should be an even mezzo-forte throughout. Make sure dynamic of the harmonics matches the dynamic of the other material.

- Try to play relatively legato at all times. Make sure not to emphasize every change of material as this will make the piece even more fractured, although small emphases are welcome.

- The 32nd note ornaments should be played in a manner similar to the ornaments in 'L'hiver Monastique'. The accents should be subtle and gentle. Although these ornaments are fully written out, the purpose of this is merely to indicate that the 32nd notes occur on the beat, rather than before. The actual rhythm of these ornaments is rather less important, so long as the 32nd notes are at least as short as regular 32nd notes.

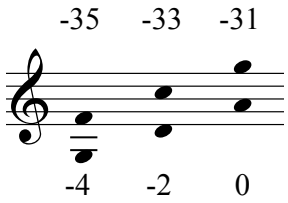
- The open strings of the violin are tuned in just perfect fifths outwards from A as such:



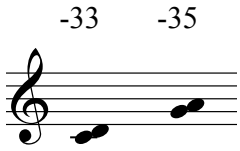
- Down arrows indicate a downward microtonal inflection of between 31 and 35 cents, matching the just minor seventh, the ratio 7:4. These down arrows only occur above a small number of pitches and chords, as shown here:



- From these downward inflections, just minor seventh chords are constructed as follows:

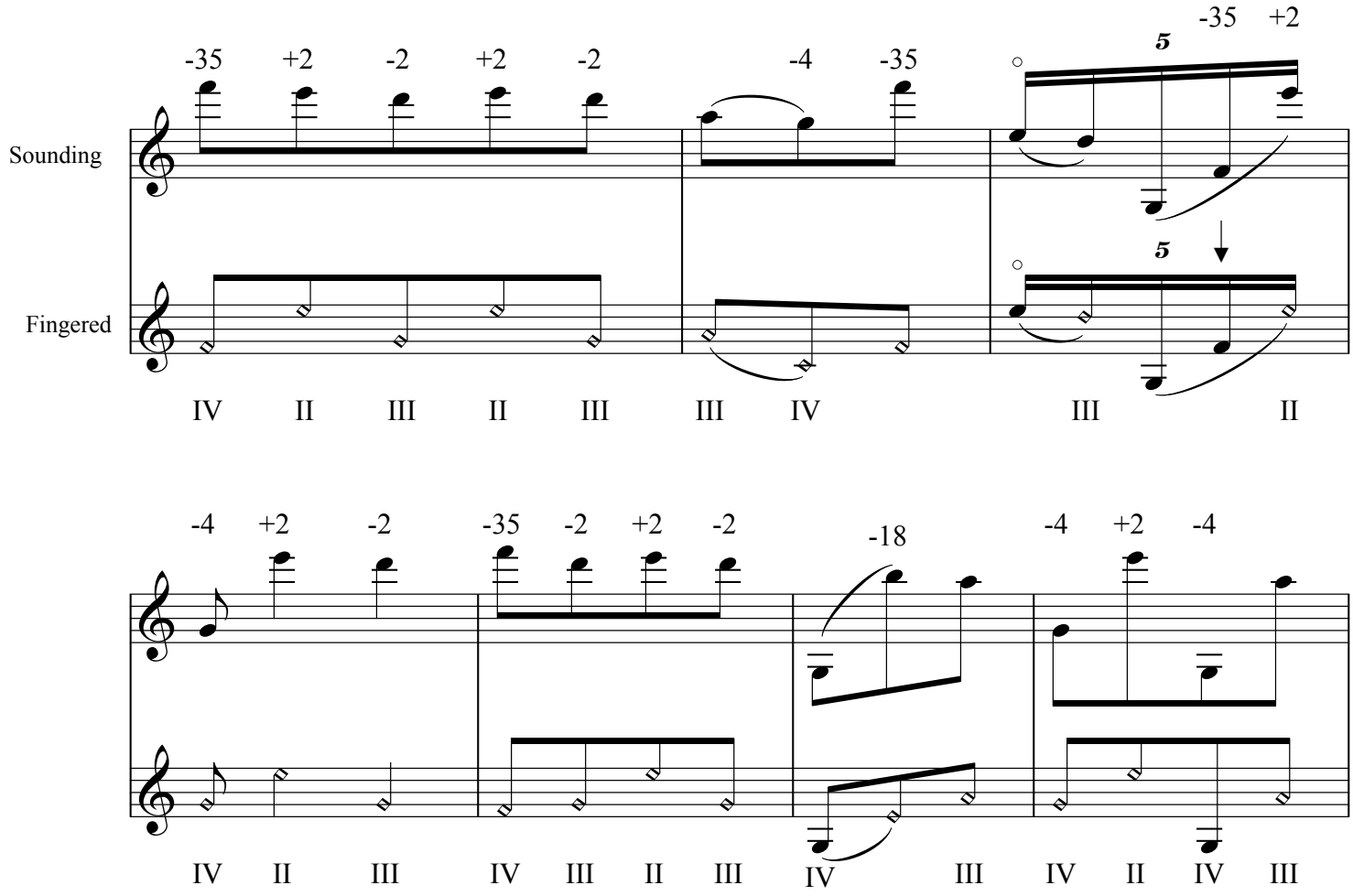


- Wide major seconds are also constructed:



- The downward inflections are put in place to match the seventh harmonics of the violin's open strings. Since I have not included an ossia staff to indicate the sounding pitch for the harmonics, an extra page is included which shows both the sounding pitches and how much these harmonics have in common with the downward microtonal inflections.

Guide to Natural Harmonics in 'Oesterle Melody'

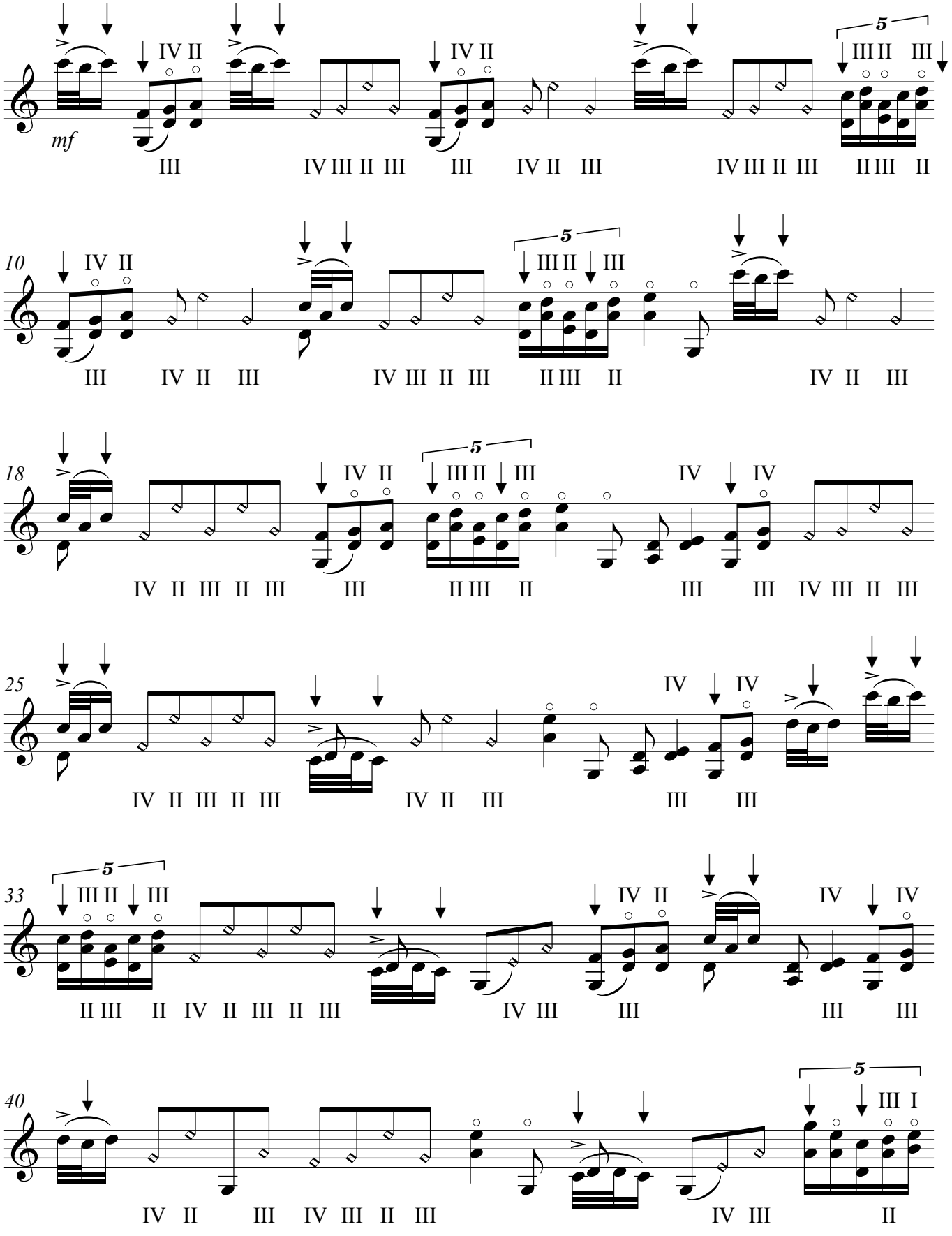


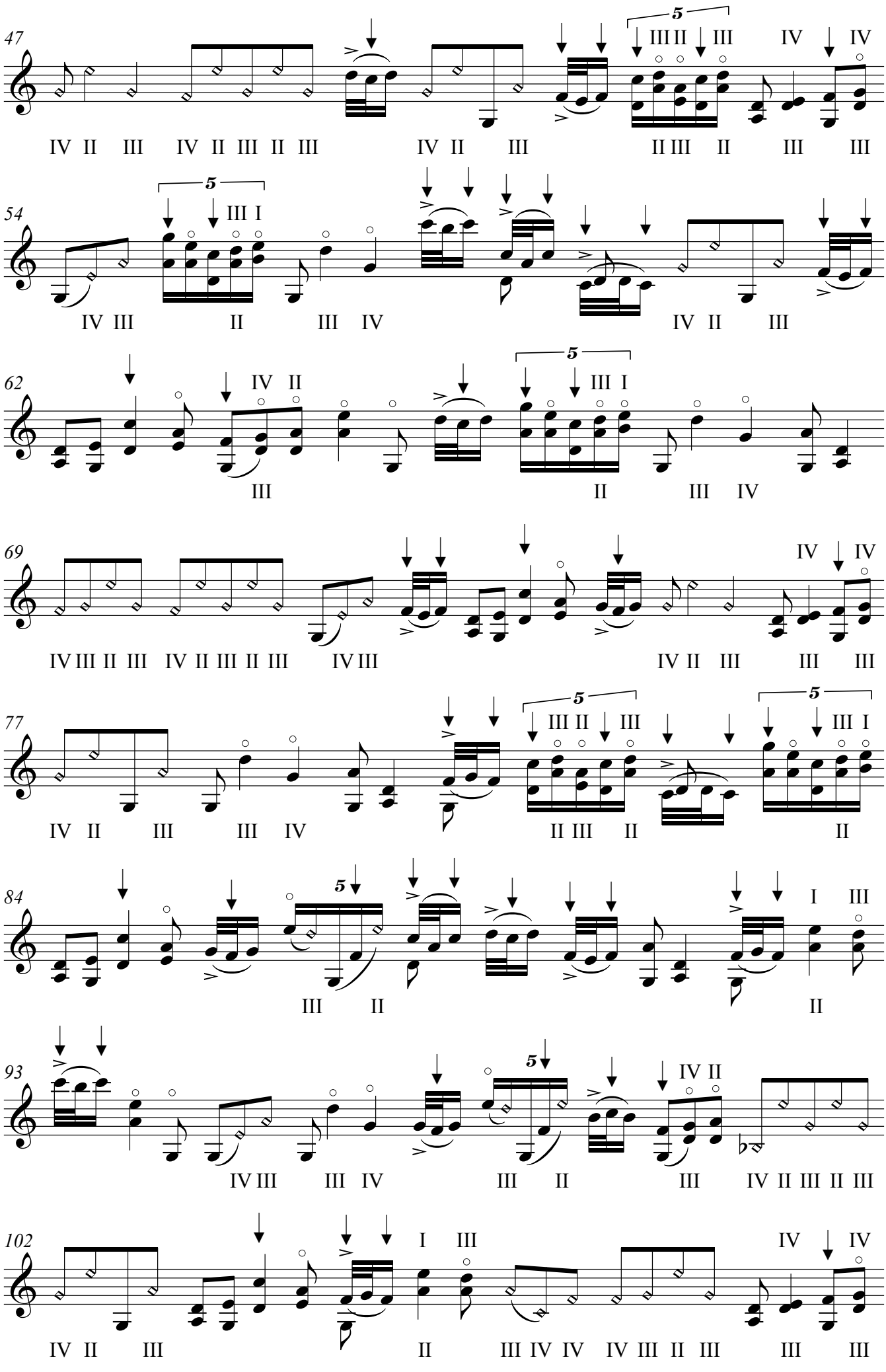
Oesterle Melody

for Michael Oesterle

♪ = 160

Hollas Longton




47
IV II III IV II III II III IV II III III II III IV IV
54
IV III II III IV IV II III
62
III II III IV
69
IV III II III IV II III II III IV III IV II III IV IV
77
IV II III III IV II III II III II
84
III II I III II
93
IV III III IV III II III IV II III II III
102
IV II III I III II III IV IV IV III II III IV IV


109
116
124
131
140
148
156
164


172
5
III I
IV II III II III II
180
I III IV IV IV II
IV II III II III II III IV III III III
187
5
III II III
IV III II III IV II III IV III II III II
195
5
III I IV II
IV II III II IV II III II III III
203
IV IV 5
III II III
III III IV III II III IV II III II III IV III
210
IV II
III IV II III II III IV III II III
216
IV IV 5
III II III IV II
III III IV II III II III II III IV III II III
223
IV II IV II
IV II III III IV III II III III

Markov Chain

for one or two percussionists

Hollas Longton

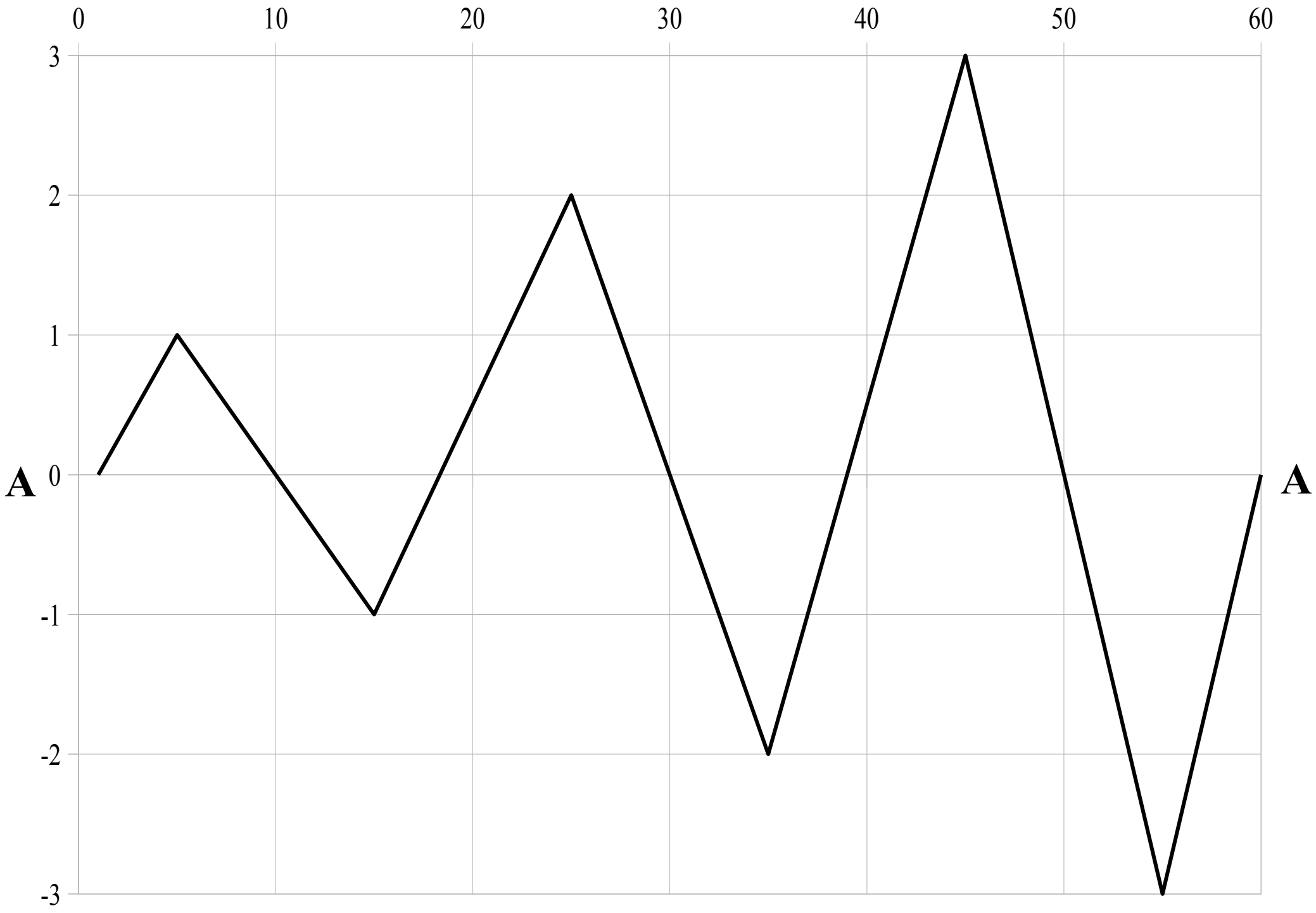
Duration: 5-9’

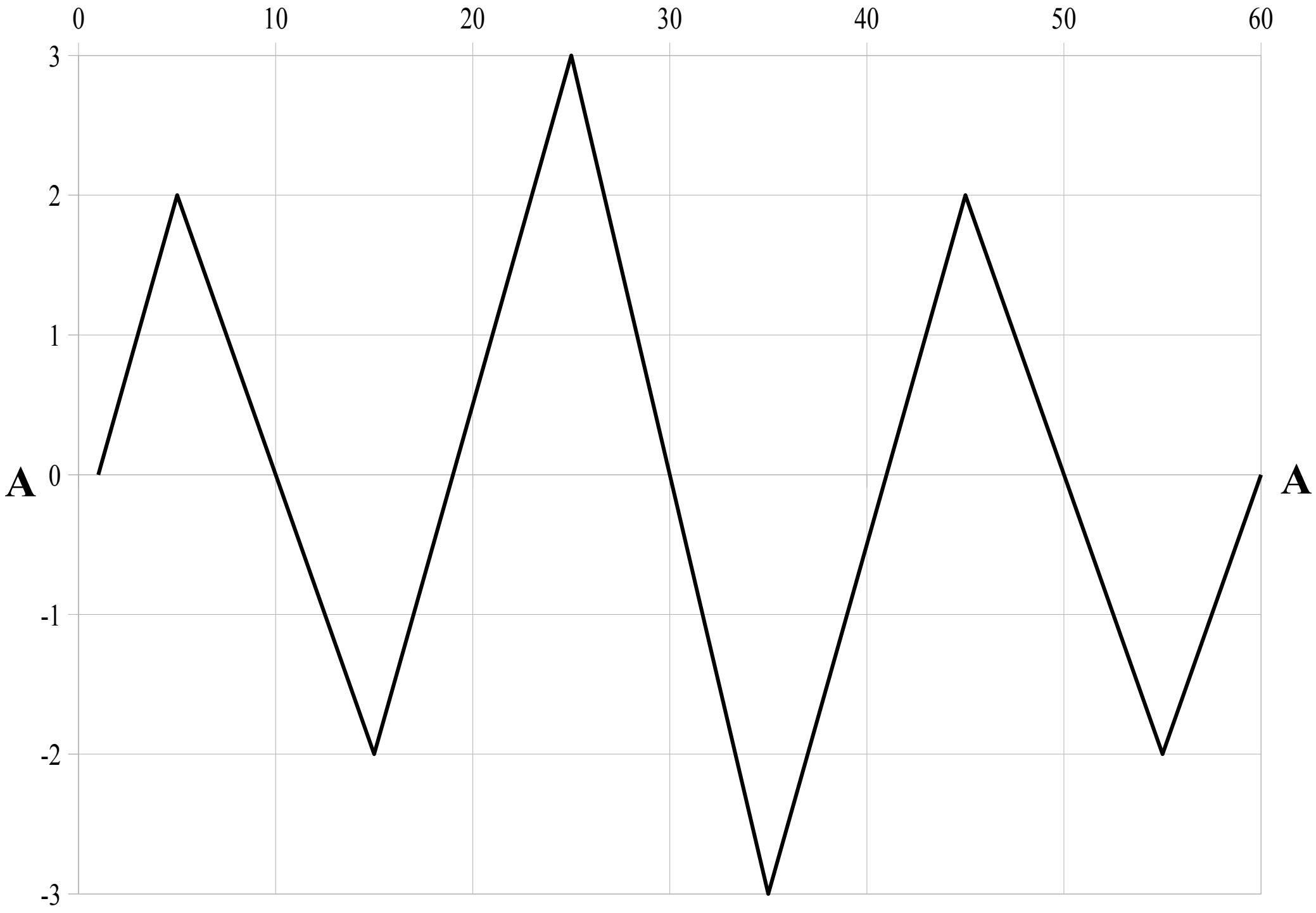
- Each percussionist should find seven unpitched percussion instruments (metal, glass, skin, stone, wood, bone, etc.) and arrange them low to high.

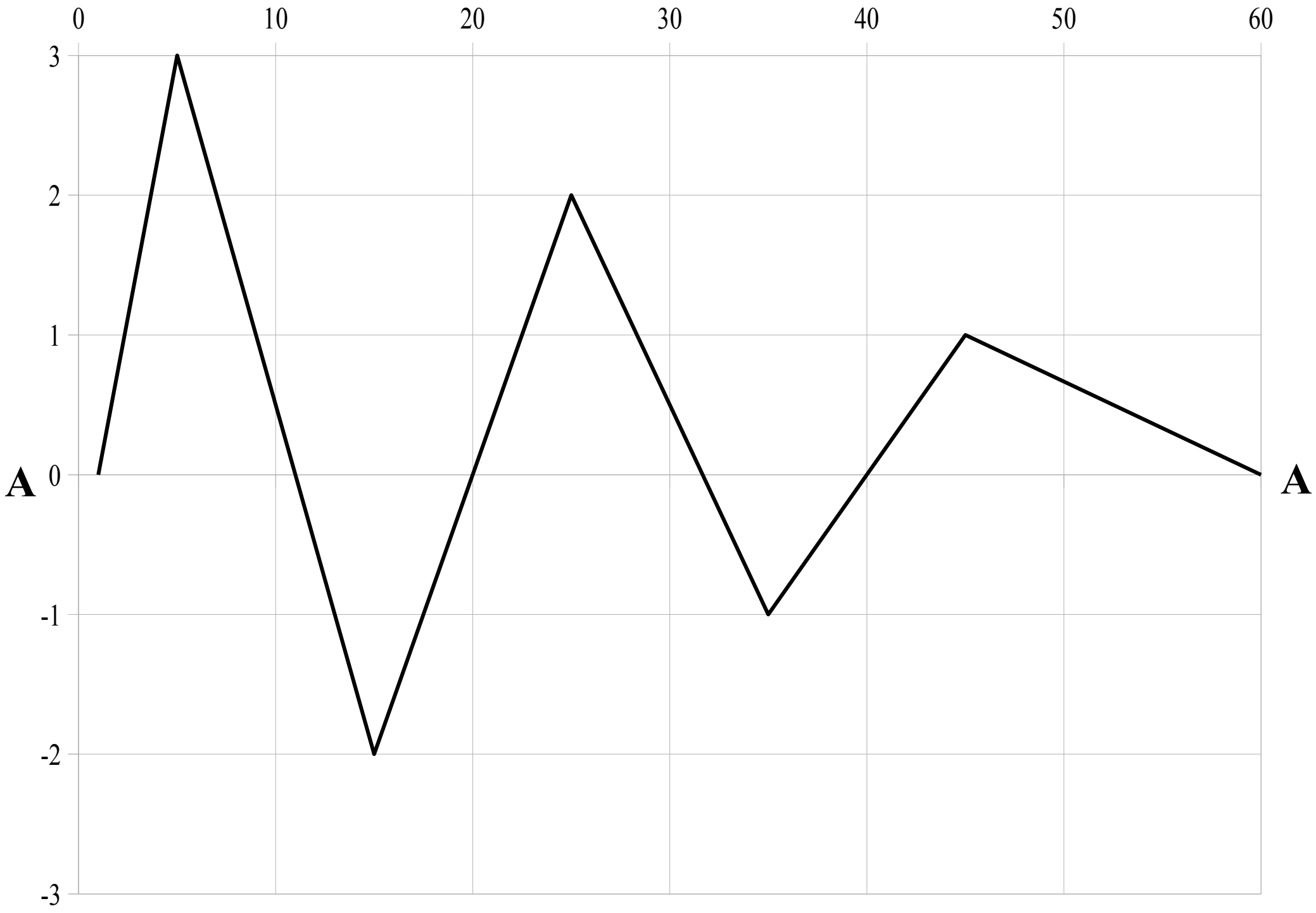
- Each page of the score is one minute long. Seconds are marked at the top of each page in intervals of ten. Instruments are marked on the left side of the page (-3,-2,-1, etc.). '-3' indicates the lowest instrument while '3' indicates the highest.

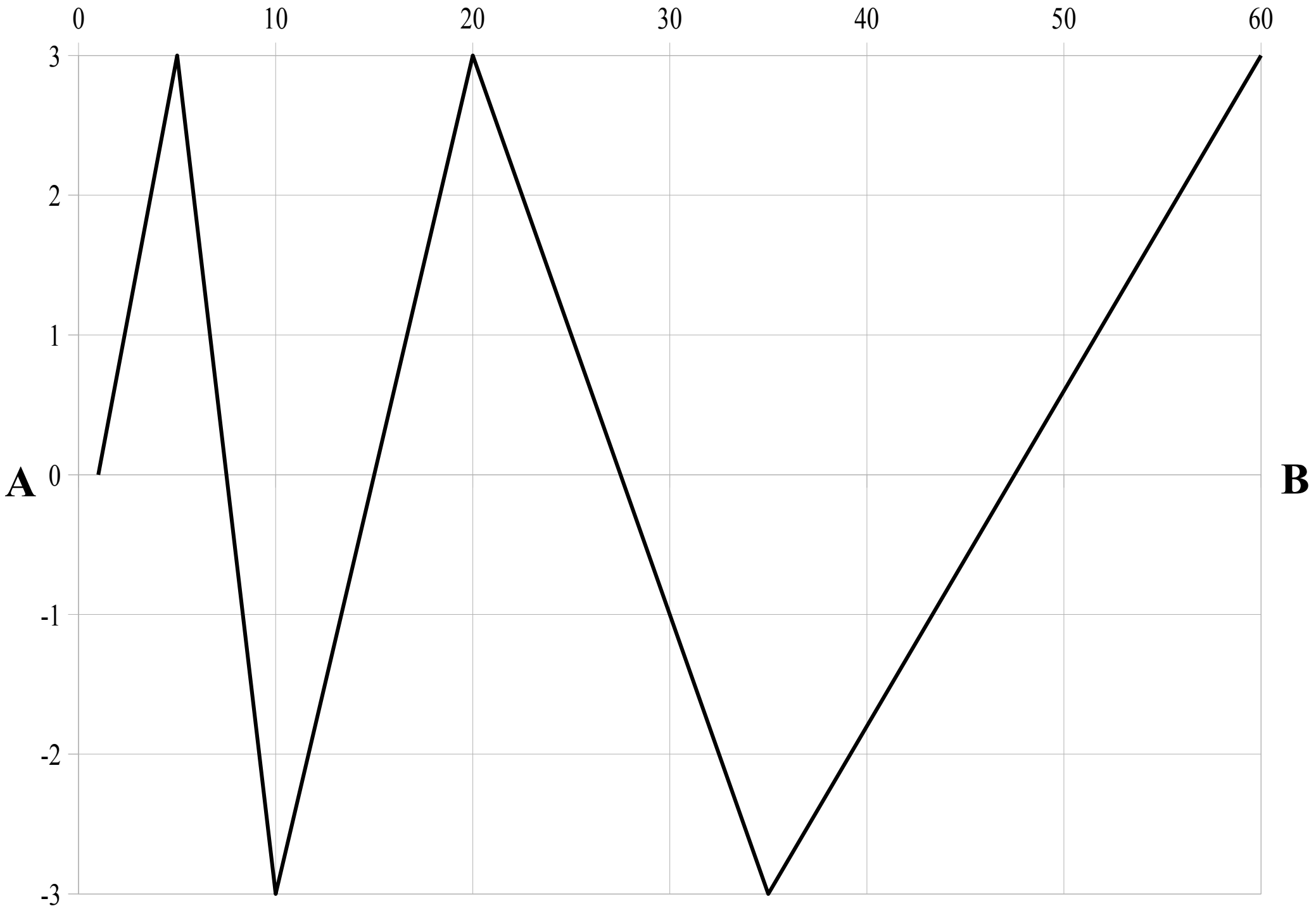
- On the left and right edges of each page are capital letters (A, B, or C). The performer(s) should order the pages of the score as they wish but so letter 'A' on the right side of the page connects to a corresponding 'A' on the left side of the next page ('C' connects to 'C' etc.) Not all of the pages must be played. If there are two performers, they may arrange the pages of their score differently from one another.

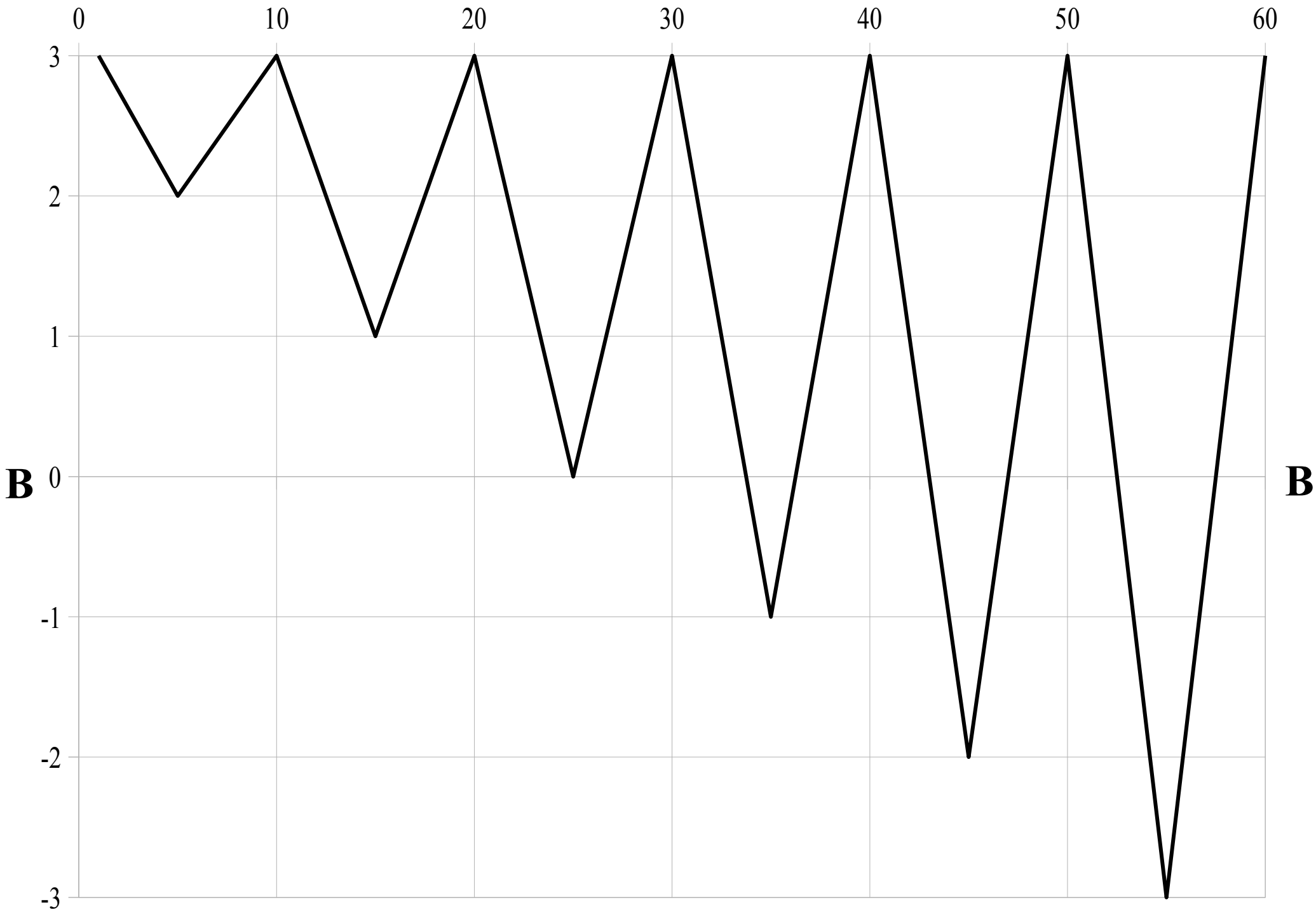
- Performers tremolo at all times, either performing one instrument or two simultaneously. The straight lines across the score indicates which instrument(s) are being played at any given time. For example, when the line lies directly on the grid line '-2', only the second lowest (-2) instrument is to be played. However, when the line lies somewhere between two grid lines then two adjacent instruments should be played simultaneously. As the line moves farther away from one grid line and closer to another, the performer should tremolo more frequently on one instrument and less frequently on the other. There should be a slow but audible timbral change from one instrument to another as the line meanders up and down the page. This piece should be imagined as a series of these timbral sweeps.

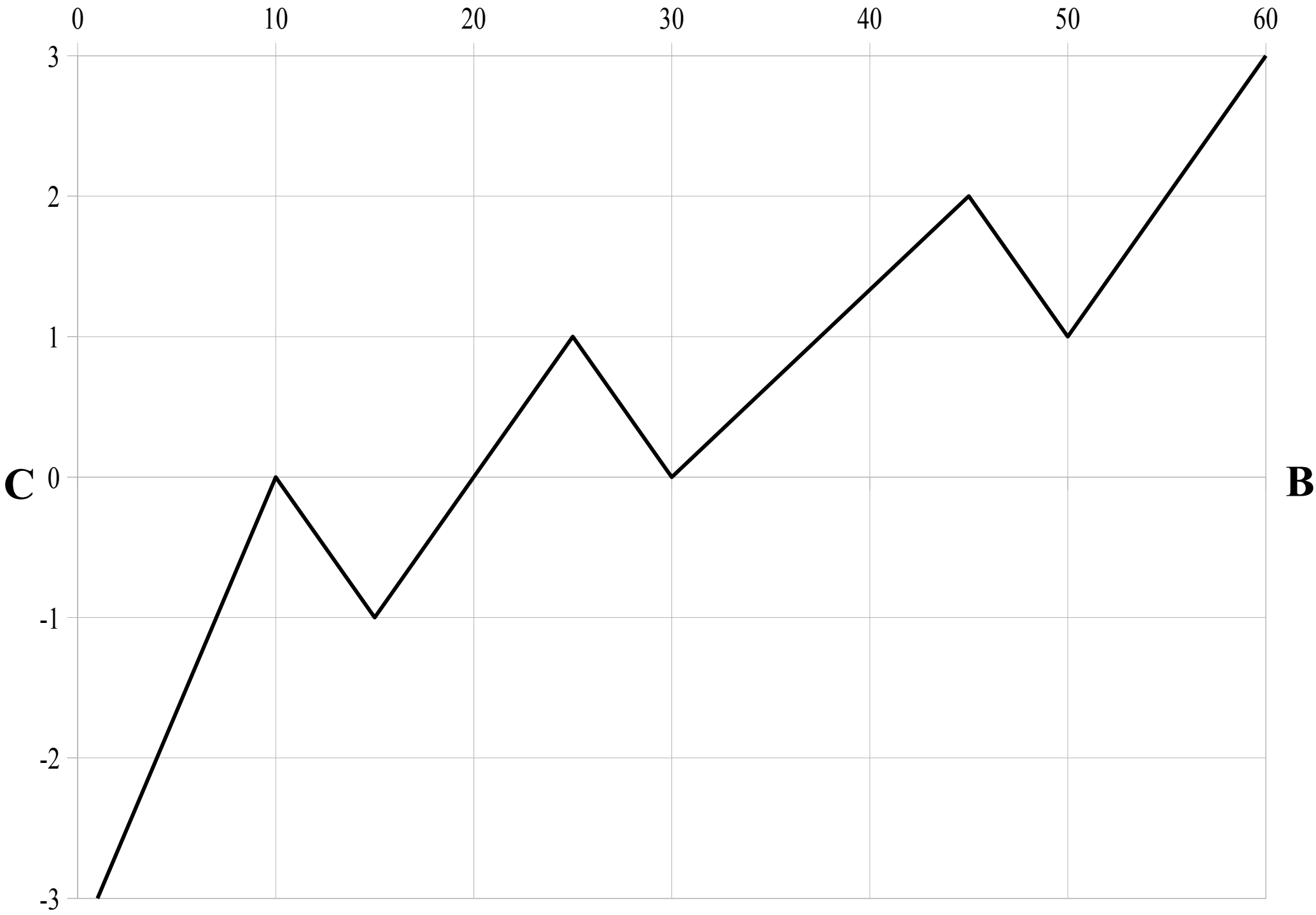

0
10
20
30
40
50
60
3
2
1
0
-1
-2
-3
A
A

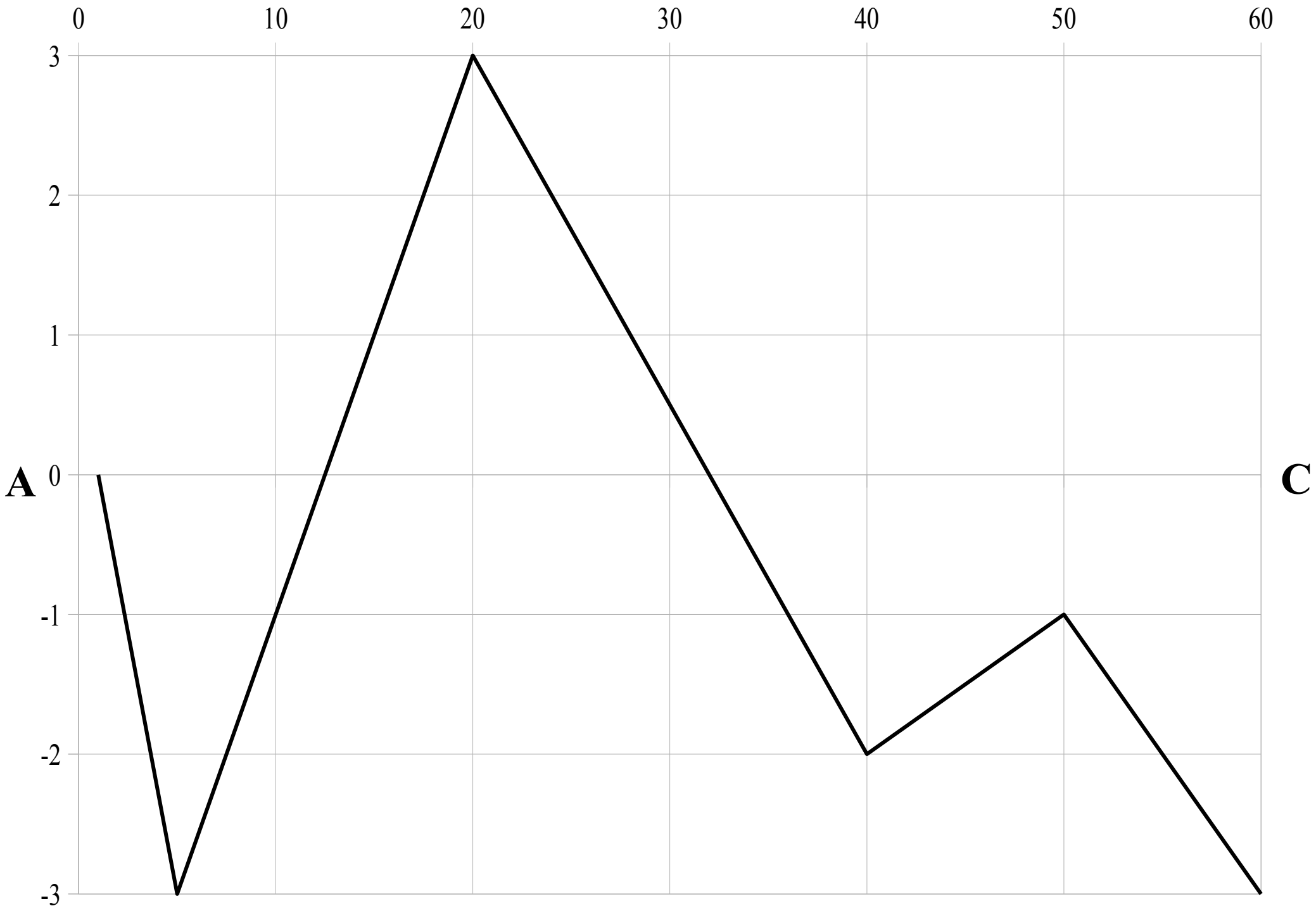

0
10
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2
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-3
A
A

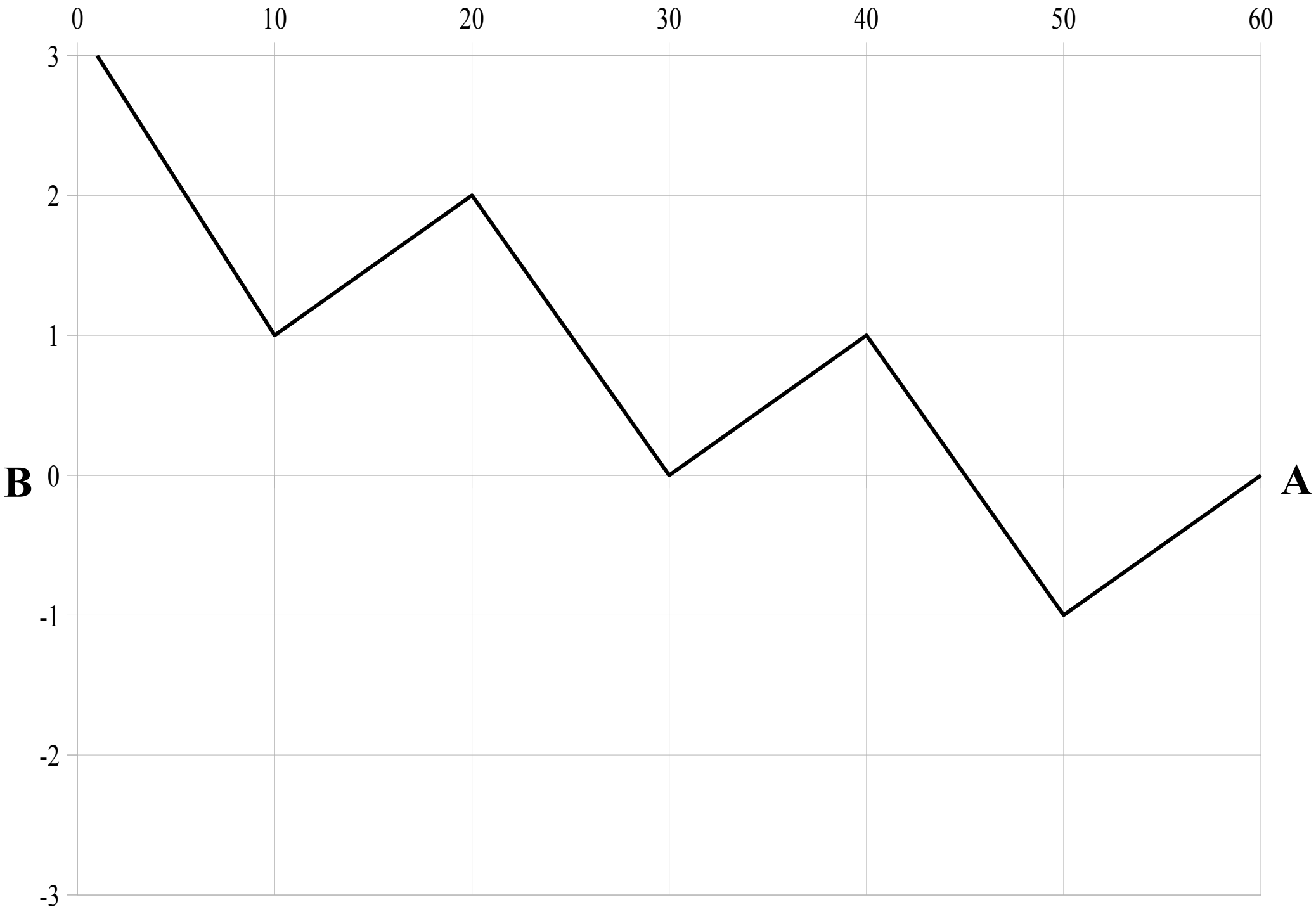

0
10
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60
3
2
1
A
0
A
-1
-2
-3

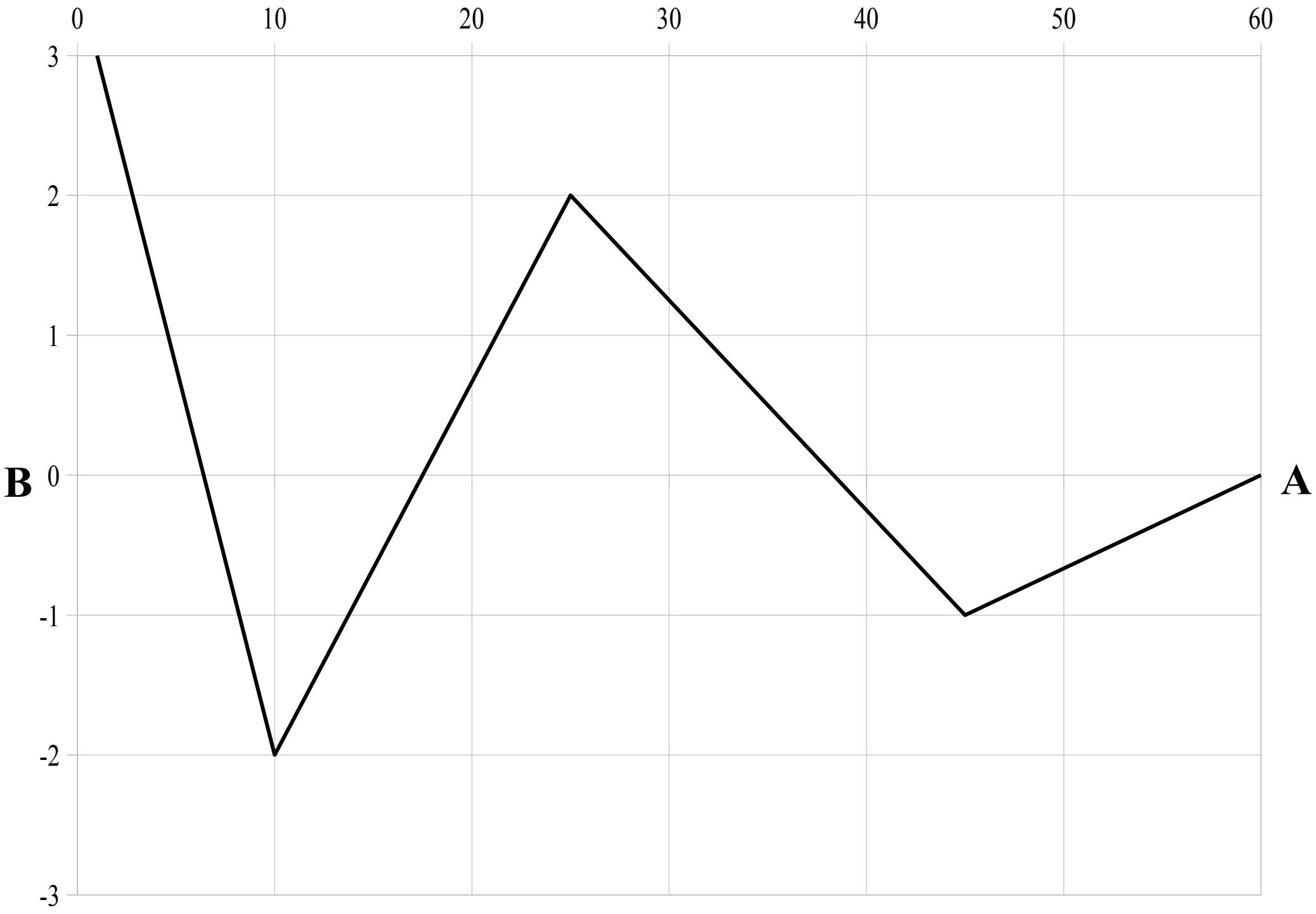

0
10
20
30
40
50
60
3
2
1
0
-1
-2
-3
A
B


0
10
20
30
40
50
60
3
2
1
B
0
B
-1
-2
-3


0
10
20
30
40
50
60
3
2
1
0
-1
-2
-3
C
B


0
10
20
30
40
50
60
3
2
1
0
-1
-2
-3
A
C


0
10
20
30
40
50
60
3
2
1
0
-1
-2
-3
B
A


0
10
20
30
40
50
60
3
2
1
0
-1
-2
-3
B
A

Arpeggio

solo piano

Hollas Longton

Duration: at least 7’

- The pedal is to be held down at all times.

Within the bottom octave of the piano, play any single pitch repeatedly, semi regularly, and at a speed fast enough so that the harmonics from this pitch gradually add up. Once a harmonic begins to become more obvious than the others find its pitch and begin playing it at a softer dynamic than the lower pitch so that they blend together. (Bear in mind that the harmonics you hear may not fit with the tuning of the piano. In this case play the closest pitch to that which fits to the tuning of the piano.) The onset of attack for the added harmonics should always occur immediately as you hear them come from the lower pitch. From these two pitches you should hear even more harmonics. As more harmonics become audible, add them one at a time to the texture (repeating the process as you have done). As you add harmonics try to play as many of them as possible until it becomes technically impossible to play them all. When it becomes impossible, begin dropping out notes beginning from the bottom and working your way up. Repeat this process until the harmonic you are hearing from the texture is higher than the top pitch of the piano. (You may need to gradually increase the dynamic level of the new bottom pitch so that higher harmonics are more audible.) When the harmonic you are hearing is higher than the highest pitch of the piano, start the process again from the bottom octave of the piano, choosing a different pitch than before. If you hear very low pitches appearing as difference tones of very high harmonics, use this low pitch as your new starting pitch. (Do not use this as the new starting pitch if it is the same as the old starting pitch.) When you restart the process, drop out the harmonics from the previous process gradually, beginning with the lowest. Play at least two processes, but play only prime numbers of processes (2,3,5,7,11,13,17,19, etc.).

36 Ghosts

String Quartet

Trent Reznor

Arr. Hollas Longton

Duration: 2’30”

- This arrangement is not meant to be literal. It is merely an attempt to emulate the peculiar tuning of Reznor's piano by using the natural harmonics of the string quartet.

- The open strings of the quartet are to be tuned in pure fifths. The A-string at 0 cents deviation is the starting point of this tuning process.

- Numbers above noteheads indicate cent deviations from the tempered scale. There are 100 cents in one semitone (1200 cents in one octave). For practice the use of tuners with cent readout is recommended.

- Hockets between instruments should be as smooth and melodic as possible. The quartet should sound like one instrument and one person.

36 Ghosts

Trent Reznor
Arr. Hollas Longton




6
+2 -35 +2 -37 -4
-4 -2 -6 -37
-2 +2 -35 -4
-4 -2 -6 -37
+2 -35 +2 -4 -37 -6
-37
-4 -37
-37
-4
-37
I II II
IV III II
I IV
IV III II
I II
-37
-37
-37
III
IV
II II
IV
III IV
-35
-37
III IV
III IV
III IV
III IV


11
-4 -2 -6 -37 +2 -35 -6 -37 -4 -2 -6 -4 -37 +2 -35 -37 -6 -37 -37 -4 -2 -6 -37
-4 -37 -4 -37 -4
IV III II I II IV III IV I II II IV III II
-37 -37
IV IV IV I IV IV IV
III IV III IV III IV III IV IV III IV


16
-2
-20
-20
-2
-4
-35
-35
-39
-20
-37
-37
-4
-37
-37
-4
-4
-39
III
III
III
II
-37
-37
-35
IV
IV
III
II
IV
-37
-37
III
III
IV
III
IV


20
-20 -35
-37 -35 -4
-2 -33 +2 -35 +2 -2
-33 -37
-2
-35
-33
-37
-37
-6 -2 -4
-4 -4
-37
-4
II IV
III I I III
II III II
IV II
-37
-37
IV II
-35
IV II IV
III
IV
IV
III IV IV III
III II
II III
III


24
-4 -35 -20
-4
-2 -6
-37 -6 -37 -2
-2 -4
-2 -37 -6 -37 -2 -37
-2 -4
IV
IV
-37
IV
IV
III
IV
IV IV
IV IV
-37 -37 -37
IV III II III


28
+2 -35
-37
-4
+2 -35
-37
-4
-37
-2 -6 -2
-37 -37 -2 -37
-2
-4
-2
-37
-2
-4
-2
-37
2'30"
-37
I
IV
II
IV
-37
IV
IV
IV
IV
-37
IV
I
-37 -37
-37
-37