

Math/Music: Aesthetic Links

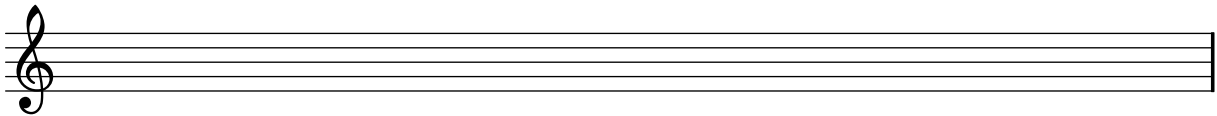
Worksheet: Twelve-Tone Method

1. Consider the *prime* or *original* tone row (P-0) given below:

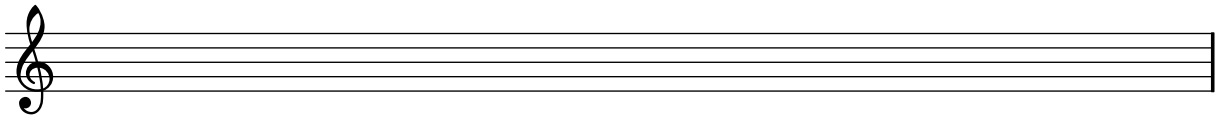
Tone Row A



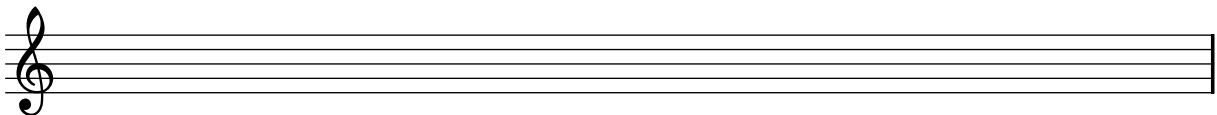
- Indicate each of the musical intervals between successive notes (e.g., m2, M2, P4, tritone, etc.). It may be useful for you to also include the number of half steps (perhaps in parentheses) as well as the name of each pitch.
- In the treble clef, write out the tone row P-2 using correct accidentals. This is the tone row A shifted up by two half steps.



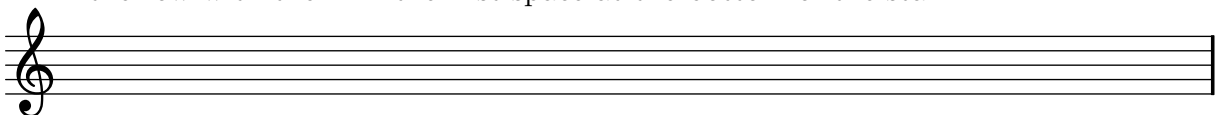
- In the treble clef, write out the tone row P-5 using correct accidentals. This is the tone row A shifted up by five half steps or a perfect fourth. Alternatively, it is the row P-2 shifted up by _____ half steps.



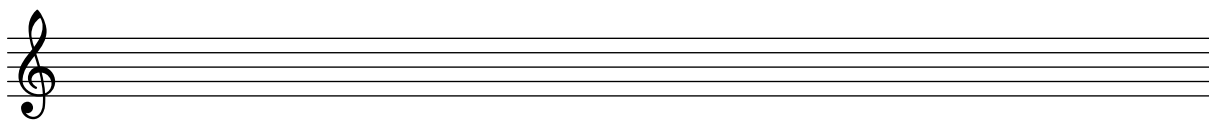
- In the treble clef, write out the tone row I-0 using correct accidentals. This is the tone row A inverted *exactly* about the first pitch D. *Hint:* It may help to go pitch by pitch, but it is also useful to remember that this is a horizontal reflection about the fourth line of the staff. The resulting row should contain each pitch exactly once.



- In the treble clef, write out the tone row I-3 using correct accidentals. This is the tone row I-0 transposed up three half steps or equivalently, the tone row P-3 inverted exactly about its starting note F. Since this row will contain many notes above the staff, begin the row with the F in the first space at the bottom of the staff.



- f. In the treble clef, write out the tone row RI-3 using correct accidentals. This is the tone row I-3 written in retrograde (backwards). Equivalently, this is the row P-3 rotated 180 degrees, although the accidentals have to be adjusted correctly after the rotation.



2. Consider the following twelve-tone excerpt based on tone row A. Each of the four voice parts follows a different row. Identify the names of each row used (e.g., P-5, R-4, I-2, etc.) What do you notice when comparing the rhythm in the treble clef with that of the bass clef?

Hint: First identify the type of the row: P, R, I or RI. This can be determined by finding the interval between the first two notes. For example, if the interval is a descending major second (whole step), then it must be a transposition P. If the interval is an ascending minor third (three half steps), then it must be a retrograde R. Once the type is identified, find the correct number by determining how many half steps up the row has been transposed from the 0 version of that type.

Excerpt using Tone Row A

3. Identify the tone rows used by Schoenberg in the opening of the Trio from the Minuet and Trio of his *Piano suite*, Opus 25 (see next page). Note that some of the rows are not ordered sequentially and that two of the rows have a pair of notes whose order is interchanged from the correct row (marked with an *). This “mistake” in ordering was either intentional by the composer for some musical reason or an honest mistake on his part. Which do you think it is?

Schoenberg's Piano Suite, Op. 25, Minuet and Trio

TRIO A

f *martellato*

35 *f* *sf* *sf*

P-0 *< sf* *sf* *sf*

sf *sf* *sf* *sf*

B

2. 40 12 11 10 9 *pp* *mf* *sf* *mp*

8 7 6 5 1 2 3 4 *sf* *mp*

poco pes

1. *f* *p* *rit.* *p*

2. *p* *rit.* *p*

* *order inverted*