International Journal of Education, Learning and Development
Vol.7, No.2, pp.10-19, February 2019
Published by European Centre for Research Training and Development UK (www.eajournals.org)

TETRAKORD PERMUTATION METHOD FOR ACCELERATING ABILITY TO READ BEAM NOTATION

Pita H.D Silitonga, Octaviana Tobing and Lamhot Basani Sihombing

Music Education Study Program (Faculty of Languages and Arts, State University of Medan)

ABSTRACT: *The ability to read music notation is very important for students in supporting their knowledge, skills and expertise in other musical sciences. So far there has not been applied the use of permutation tetrakord as a first step to reading music notation. In this method each interval change has been mapped in such a way as permutations of one note, two notes, three notes, and four notes. By utilizing a combination of intervals through tetracord permutation it is expected that learners become accustomed to reading, playing, and listening to succession intervals so that it is easy to recognize interval successions contained in various musical works both in visual and auditive forms. Learners are given a theoretical understanding of tetracord permutations followed by reading permutations of tetracords, listening to permutations of tetracords, and replaying the succession of permutation intervals of tetracords dictated audio. At the end of the lesson, the learner is invited to analyze a number of songs to prove that the succession of intervals that have been mapped and learned is evident in the songs.*

KEYWORDS: tetrakord; permutation; interval

INTRODUCTION

The ability to read music notation is an important thing that can improve the ability to master music through practical and theoretical. Reading skills include musical notation with vocals and instrumentals. Mastery of science, science, science, science, science, science, science, science, science and instruments, etc. Thus the ability to read music notation is needed to master other musical sciences.

The fact found in the field is that there are still a number of students (in Special Unimed) in the second semester, III and so on. who still lacks the ability to read and master music notation. Training conducted in class, Harmony, Compositions, Vocal Practice, etc.

It is necessary to develop a method that can help students faster and better than vocal and instrumental practices. For reasons, there is no standard method for reading melodic notations. In this permutation method interval succession is mapped first because in principle reading or singing a melody is invoking an interval.

The method that will be developed begins with an understanding of the concept of tetrakord, an ancient Greek scales. Tetrakord is a scale that is composed of four notes with a scale of 1-1-1 / 2 (two unit notes and one middle note). An example of a tetrakord is C - D - E - F (first tetrakord of the Cmayor scale).

Diatonic scales are composed of two tetrakords namely C - D - E - F (tetrakord I) and G - A - B - C '(tetrakord II). By using mathematical permutations, each tetrakord is contrasted with

Print ISSN: 2054-6297(Print), Online ISSN: 2054-6300(Online)

different intervals (1,2,3 and 4) and interval quality (perfection, major, and minor) like a melody interval.

Sound Element

Music is a series of sounds in time. Sound elements are organized or arranged so that the results of structuring our sounds are perceived as music. Sound elements include duration, pitch, dynamic, and timbre (Ronald Pen, 1992).

Duration element is organizing time with derivatives in the form of symbols of relative time (time notation), tempo, sukat, and rhythm. If in physics the smallest time unit (also applies in everyday life) in the form of seconds and is constant then in music time unit in the form of a relative beat. One hour is equivalent to 60 minutes, one minute is equivalent to 60 seconds. But 60 beat in music is not necessarily equivalent to one minute. As an illustration, compare an hour at a birthday party with an hour in the morgue quantitatively is equal to 3600 seconds but one hour in the morgue will feel longer as if the clock seconds are running very slowly to reach the 3600 second . In music aesthetics, structuring the elements of time gives emotion in music.

The pitch element is the organization of high and low tones with derivatives in the form of tones (single tones), ladder tones, intervals, and quality intervals. In physics, pitch is determined by the number of vibrations per second (frequency, f) in Hertz (Hz.). Frequency magnitude in physics is indicated by numbers while in music is indicated by alphabet (A, B, C, D, E, F, and G). For example, a sound with a 440 Hz sequence in music is known as tone A (6th note counts from the middle C note). Arranging duration and pitch produces melodies, harmonies, and contours.

Dynamic elements are strong organizing-weak or hard-soft sounds. The dynamic element in physics is amplitude or sound intensity that is quantitative in units of *decibels* (dB). Only, in dynamic music is qualitative (relative) the symbols are displayed not by numbers but in the form of letters (*f, p, mf, mp, etc*.), in the form of words (*crescendo, decrescendo* or *diminuendo*), and in the form of images (dan).

Timbre element (tone color) is a function directly from a sound source. When we hear a musical idea, the idea is always presented to us through a sound source and it is always associated with timbre. For example, someone who plays musical ideas with a guitar with strings as a source of sound then we will perceive the sound as a guitar sound not as the sound of a flute or other musical instrument. Based on the direct function of a sound source, timbre is a criterion in classifying musical instruments. The classification of musical instruments based on sound sources is chordophones, aerophones, idiophones, membranophones, and electrophones.

The connection of music (diatonic music) with physics and mathematics is very close. Without physics and mathematics it is very prayer to realize sound elements which are the raw material for music creation. It's just that, in music measurements become relative or physical sounds are symbolized no longer by nominal numbers but by letters, images, and graphics.

Print ISSN: 2054-6297(Print), Online ISSN: 2054-6300(Online)

LITERATURE REVIEW

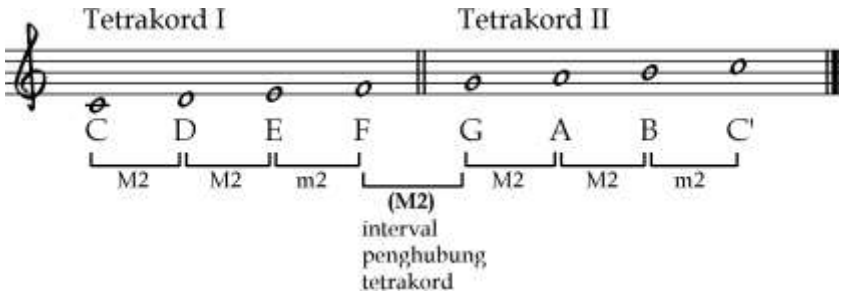
Tetrakord

Prier SJ (2006: 24) suggests that the Greek scales are called diatonic scales which are a series of tetrakords which means: four (= tetrares) strings (= chorda). As per the custom in Greek instrumental music that uses only four strings. This tetrakord is referred to as a diatonic because of the four strings (notes) there are at least two steps of the whole tone (2 tonos) and one step medieval (1 semitonos). Of the two tonos (diatonos) this is the term diatonic and diatonic scales appear.

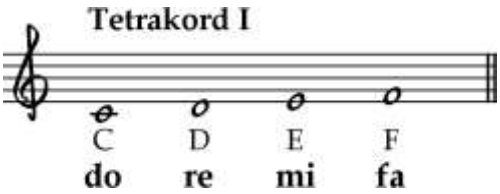
Ronald Pen (1992: 77) defines scales as a series of sequential tones which form the basis of structuring melody and harmony. Mastery of the scales both theoretically and practically will make it easier for us to write, read, and write arrangements and composition of music.

A major scale consists of two tetrakords. The Tetrakord consists of four consecutive notes which compose a one octave scale. For example, the Tetrakord I of the C major scale is C-D – E - F. Tetrakord II from the C major scale is G — A — B — C. These two tetrakords (I and II) are connected by a major scale interval 2 (M2) so that a diatonic C major scale is formed. The beam notation of the two tetrakords is as follows:

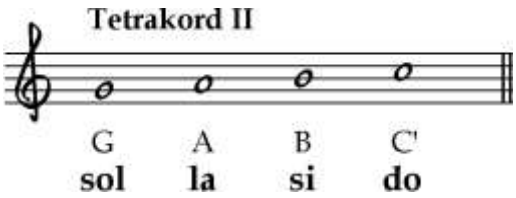
Tone C Major Ladder



Solmization or designation of the tones of each tetrakord is' do 'for C,' re 'for D,' mi 'for E,' fa 'for F,' sol 'for G,' la 'for A, and' si 'for B as follows:



Print ISSN: 2054-6297(Print), Online ISSN: 2054-6300(Online)



Permutation

Permutation is the determination of the number of arrays of a number of elements without repetition. Permutation is defined as the arrangement of n different elements by considering the sequence called permutations of the n elements (Setya Budhi, 2003: 161).

If we want to calculate permutations of n elements, then the first element has n possibilities. Because there can be no repetition, then the second element is probably n - 1. The third element has n - 2 possibilities, and so on until the last element has only one possibility. So the number of permutations is:

$$(n) \text{ x } (n - 1) \text{ x } \ldots \text{ x } (2) \text{ x } (1) = 1 \text{ x } 2 \text{ x } \ldots \text{ x } n \text{ and } 0! = 1$$

Factorial definition is if n natural numbers, writing n!, Are read factorial n, meaning as 1 x 2 x ... x n. thus the number of permutations n elements, written as follows:

$$P_n{}^n = n!$$

The number of permutations of 3 different elements is:

$$P_3{}^3 = 3! = 1 \text{ x } 2 \text{ x } 3 = 6$$

The number of permutations of 4 different elements is:

$$P_4{}^4 = 4! = 1 \text{ x } 2 \text{ x } 3 \text{ x } 4 = 24$$

Permutations of *r* elements of *n* different elements, for example, are known to be *n* different elements. The number of permutations of r elements ($r \leq n$) taken from n elements is

$$P_r{}^n = \frac{n!}{(n-1)!}$$

The number of permutations of two letters taken from C, D, E is

$$n = 3, r = 2$$

$$P_2{}^3 = \frac{3!}{(2-1)!} = \frac{3!}{1!} = \frac{1 \; x \; 2 \; x \; 3}{1 \; x \; 1} = 2 \text{ x } 3 = 6$$

Six permutations that appear are

1. The base letter C is CD, CE;

2. The letter base D is DC, DE;

Print ISSN: 2054-6297(Print), Online ISSN: 2054-6300(Online)

3. The base letter E is EC, ED.

The number of permutations of four notes taken from C, D, E, F (Tetrakord I from the C mayor scale) is a four-digit permutation of four numbers. So n = 4, r = 4, the total number of permutations is:

$$P_4{}^4 = \frac{4!}{(4-4)!} = \frac{4!}{0!} = \frac{1\ x\ 2\ x\ 3\ x\ 4}{1} = 2 \text{ x } 3 \text{ x } 4 = 24$$

Dua puluh empat permutasi yang muncul adalah:

1. Nada pangkal C yaitu CDEF, CDFE, CEDF, CEFD, CFDE, CFED;
2. Nada pangkal D yaitu DCEF, DCFE, DECF, DEFC, DFCE, DFEC;
3. Nada pangkal E yaitu ECDF, ECFD, EDCF, EDFC, EFCD, EFDC;
4. Nada pangkal F yaitu FCDE, FCED, FDCE, FDEC, FECD, FEDC.

Interval

The interval is the height between two musical tones. The importance of understanding intervals is because melodies are a succession of intervals. So, in principle the song or song we hear is interval changes with various variations.

This beriku interval table is the development of the relationship between switches and intervals proposed by Ronald Pen:

INTERVAL STANDARD TABLE (Interval Name Based on the number of semitone scales)

NO.	PITCH	STEP DISTANCE	AMOUNT OF SEMITONE	INTERVAL NAME
1.	**C—C**	1	0	**Perfect 1st (P1)** or Pure Prim
2.	**C—C#**	1	1	**Augmented 1st (A1**) or More prim
3.	**C—Db**	2	1	**Minor 2nd (m2)** or small sekonde
4.	**C—D**	2	2	**Major 2nd (M2)** or Big sekonde
5.	**C—D#**	2	3	**Augmented 2nd (A2)** or more sekonde
6.	**C—Eb**	3	3	**Minor 3rd (m3)** or Small ters
7.	**C—E**	3	4	**Major 3rd (M3)** or big ters

Print ISSN: 2054-6297(Print), Online ISSN: 2054-6300(Online)

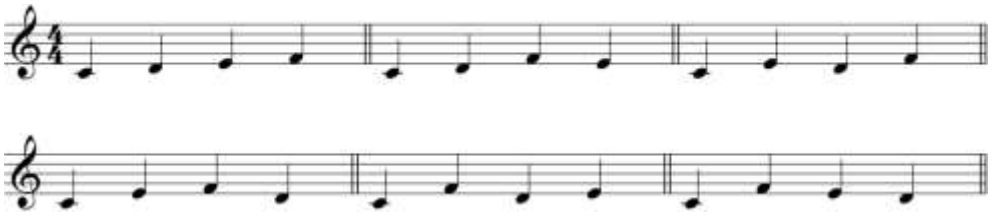
8.	**C—E$^{\#}$**	3	5	**Augmented 3rd (A3) or** Ters more
9.	**C—F^{b}**	4	4	**Diminished 4th (d4)** or Less quart
10.	**C—F**	4	5	**Perfect 4th (P4) or** Pure quart
11.	**C—F$^{\#}$**	4	6	**Augmented 4th (A4)** or more Kuart
12.	**C—G^{b}**	5	6	**Diminished 5th (d5)** or more quart
13.	**C—G**	5	7	**Perfect 5th (P5)** or pure Kuint
14.	**C—G$^{\#}$**	5	8	**Augmented 5th (A5)** or more Kuint
15.	**C—A^{b}**	6	8	**Minor 6th (m6)** or small Sekt
16.	**C—A**	6	9	**Major 6th (M6)** or big Sekt
17.	**C—A$^{\#}$**	6	10	**Augmented 6th (A6)** or more Sekt
18.	**C—B^{b}**	7	10	**Minor 7th (m7)** or Small Septim
19.	**C—B**	7	11	**Major 7th (M7)** or Septim major
20.	**C—C^{b}**	8	11	**Diminished 8th (d8)** or Less octave
21.	**C—C**	8	12	**Perfect 8th (P8)** or Pure octave.

DISCUSSION

Permit Tetrakord

Mutated Tetracords are arranged in such a way that they are simple to read. Sukat 4/4 with the rhythm of the quarter note will make it easier for learners to read and feel the succession of intervals of each permutation of the tetrakord.

The following is an example of the first permutation of the tetrakord from the C major scale. The four-tone permutations with the starting pitch C from the first tetrakord are as follows:



Each four-tone permutation has a distinctive succession of intervals. Note the CDEF contains the intervals of M2, M2 and m2. CDFE contains intervals of M2, m3 and m2. CEDF contains M3, M2, and m3 intervals. CEFD contains M3, m2 and m3 intervals. CFDE contains intervals of P4, m3, M2. CFED contains intervals of P4, m2, and M2.

The type of interval contained in the four-tone permutations of the first tetrakord consists of m2, M2, m3, M3, and P4. Because the second tetrakord has the same proportion of interval structure as the first tetrakord, the types of intervals contained in the four-tone permutations of the second tetrakord also consist of m2, M2, m3, M3, and P4.

Print ISSN: 2054-6297(Print), Online ISSN: 2054-6300(Online)

Permutation results from tetrakord can be combined with certain rhythmic patterns and certain sukat so that it is more melodic as the melodies of existing songs. So it doesn't seem like just singing intervals without any rhythmic elements that imply emotion on music so practicing reading music notation becomes more fun.

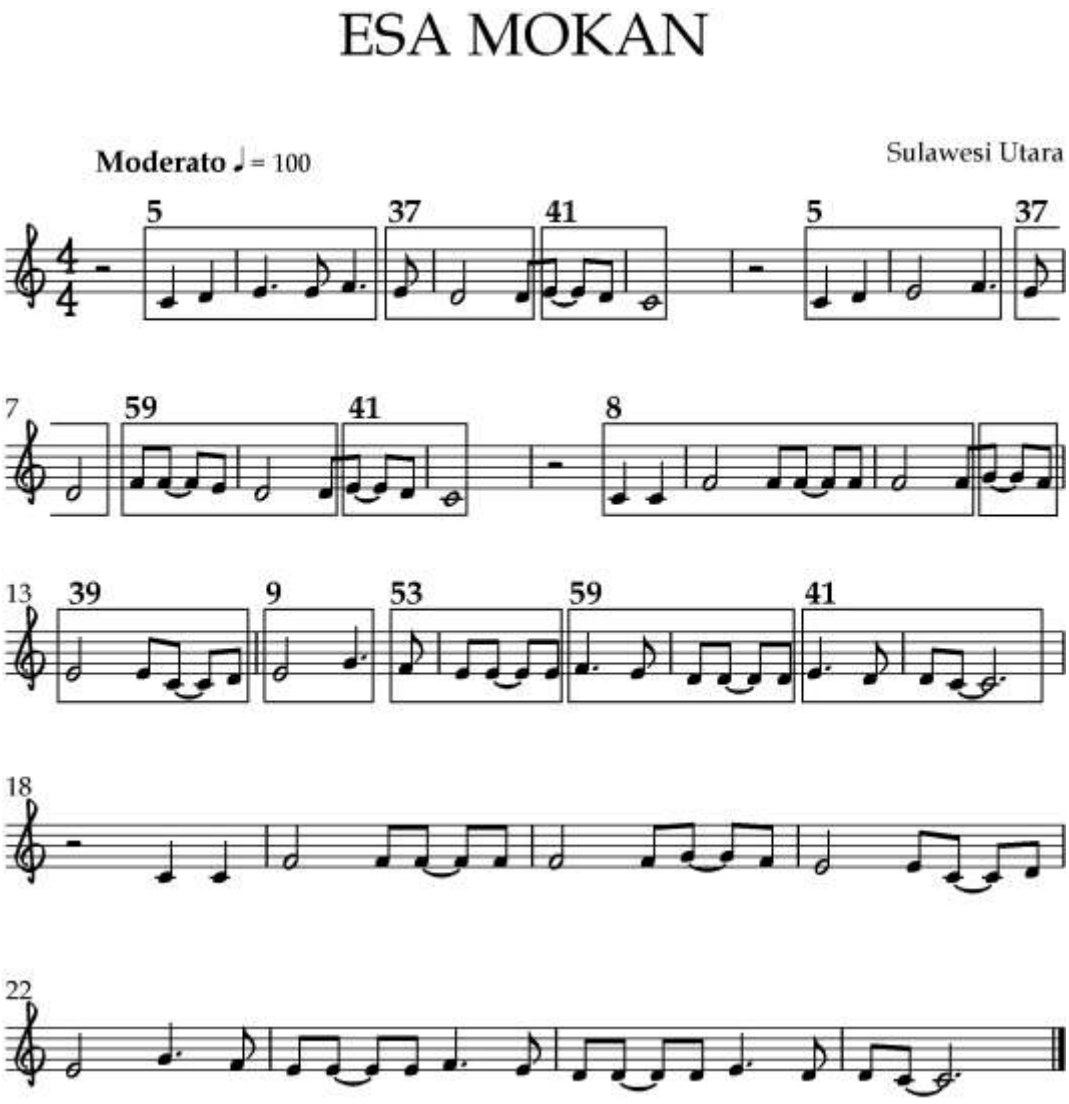
If the melody is an interval succession as defined by Ronald Pen (1992), practicing singing permutations or playing with a musical instrument is the first step to mastering music reading both with vocals and instruments. The reason is from the tetrakord permutations (I and II) and the relationship between the tones between the first tetrakord and the second tetrakord has mapped the possibilities of interval succession. Therefore it is necessary to arrange training materials to read music notation based on the permutation of tetrakord and do research on its impact on the learner's ability to master music reading. The results of the study are expected to take the form of textbooks about reading music notation using the permutation method of tetrakord.

Analysis of Interval Succession in a Song Based on Tetrakord Permutations

The following song Esa Mokan from North Sulawesi is used as a sample for analysis of succession intervals. In each numbered box in the upper left, there are pieces of melodic notes that compose the song Esa Mokan. The pieces of the melody contain tones whose succession intervals have been mapped in permutations of the tetrakord.

The numbers on the top left of each box can be referenced in the training material to read musical notes with the tetrakord permutation method (attached). Example: box number 5 contains notes C, D, E, and F according to the notes that have been mapped in the training material number 5 (see attachment). The box number 37 contains E and D notes according to the notes that have been mapped in the training material number 37 (see attachment). And so on, every interval movement in the song Esa Mokan has been mapped in permutations of tetrakords with certain numbers.

Print ISSN: 2054-6297(Print), Online ISSN: 2054-6300(Online)



CONCLUSION

Mapping interval movements with permutation tetrakord makes it easy for learners to recognize interval combinations that appear in various songs or musical works. Through regular training and directed methods of permutation tetrakord can improve learners' ability to read, listen, and play melodies.

REFERENCES

Hartayo, Jimmy. 1994. *Musik Konvensional Dengan 'Do Tetap'*. Yogyakarta: Yayasan Pustaka Nusatama.

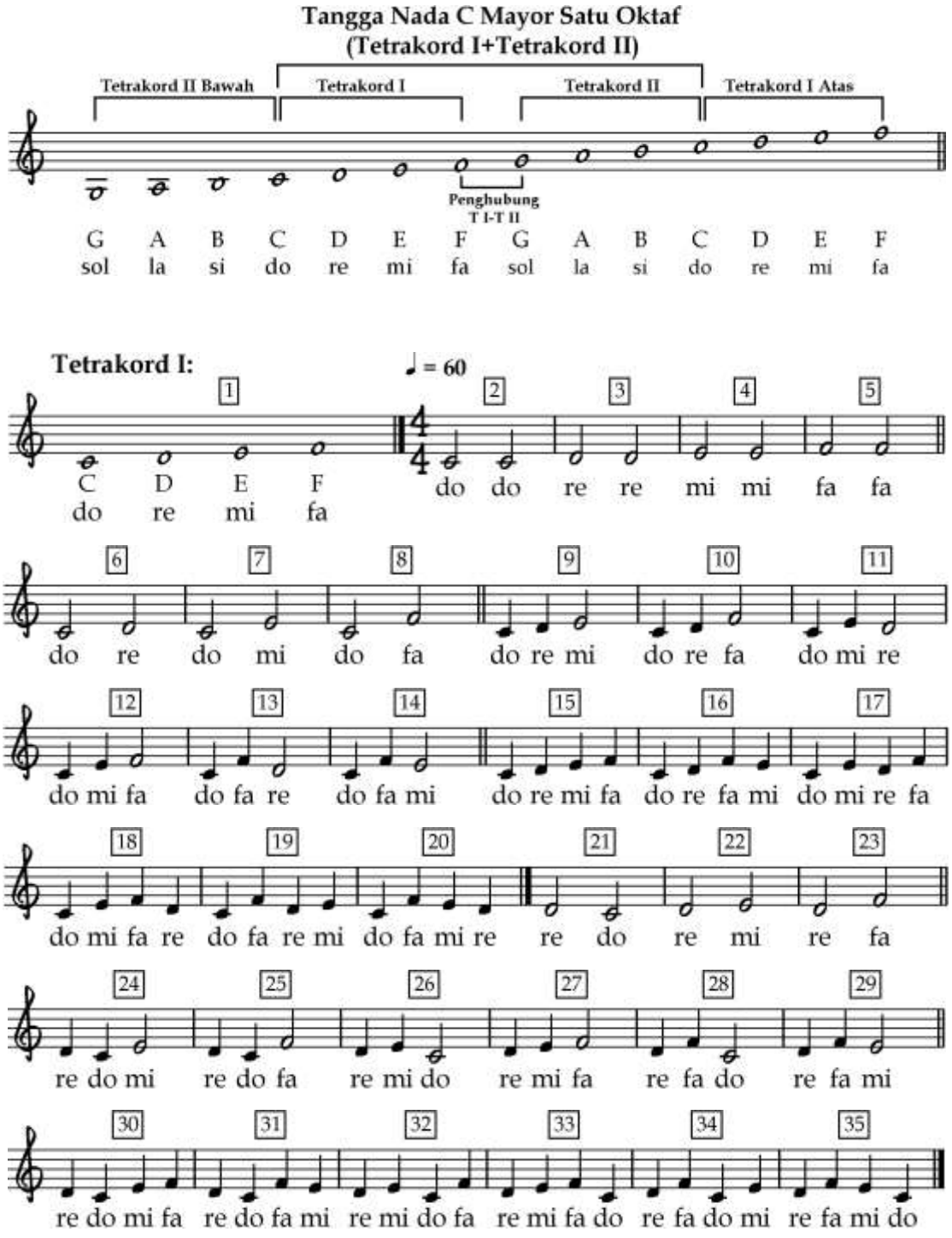
Pen, Ronald. 1992. *Introduction to Music*. McGraw-Hill, Inc.

Prier sj, Karl-Edmund. 2006. *Sejarah Musik Jilid 1*. Yogyakarta: Pusat Musik Liturgi.

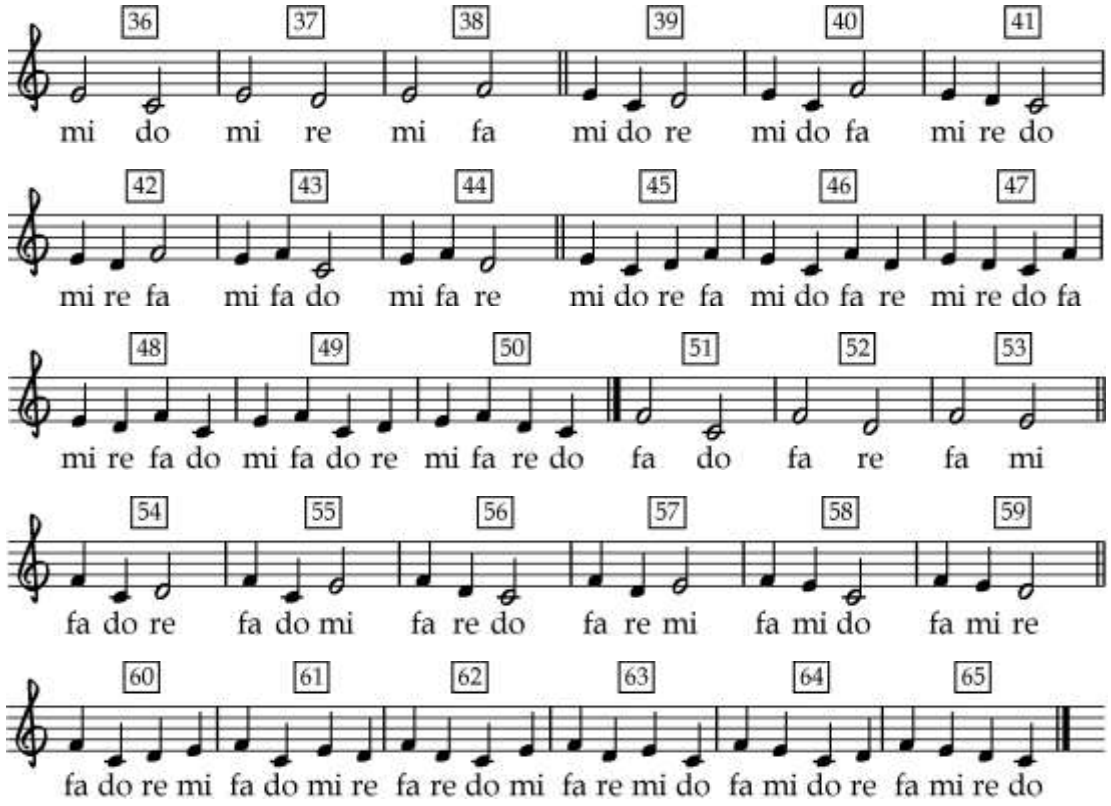
Print ISSN: 2054-6297(Print), Online ISSN: 2054-6300(Online)

Setya Budhi, Wono. 2003.*Langkah Awal Menuju Ke Olimpiade Matematika.* Jakarta: Ricardo.
Sylado, Remi. 1983. *Menuju Apresiasi Musik*. Bandung: Penerbit Angkasa
Yaumi, Muhammad. 2013. *Prinsip-Prinsip Desain Pembelajaran.* Jakarta: Kencana

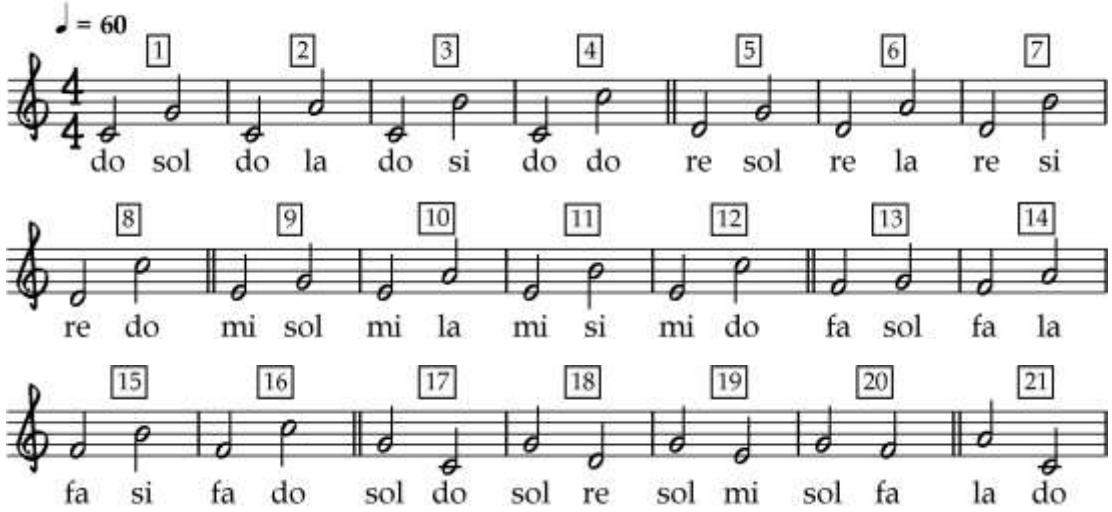
ATTACHMENT
EXERCISE MATERIALS READ NOT BEAMS WITH THE TETRAKORD PERMUTATION METHOD (Special Tetracord I)



Print ISSN: 2054-6297(Print), Online ISSN: 2054-6300(Online)



Relasi Lintas Tetrakord T I-T II:



Print ISSN: 2054-6297(Print), Online ISSN: 2054-6300(Online)