



8

Name That Function

Determining Function Transformations by Listening

TRACKS
48-72

Name That Function is a collection of six activities that use function transformations similar to those in *Functional Composer*, First and Second Movements. The activities follow the format of a guessing game as in the old television show *Name That Tune*, where contestants competed to name a tune from the first few notes. Here students apply their knowledge of functions and mathematical relationships to make strategic, informed guesses about the identity of a mystery function. In each game, a melodic line is played, followed by a mathematical transformation of that line. The initial goal is for students to determine the equation of the mystery transformation exclusively by ear. To assist this process, the notes of the original and transformed melodies are assigned number values, treated as functions, and

compared. Ultimately students use note numbers (with in/out tables and graphs if necessary) to determine the exact equations of the transformations. Each game involves four transformations of a single motif.

The games are versatile; they can be used individually as short warm-up exercises or used together in an entire class session. The process can also be reversed, with students attempting to sing the transformations from their equation representations.

Unlike *Functional Composer*, this activity does not require graphing. Name That Function emphasizes the melodic aspect and forces students to resort to a mathematical model (a graph or calculation) of their own devising as a tool for determining the equations.

HINTS AND STRATEGIES

Listen to the motif and transformation played from the CD.

Determine how the motif has been transformed.

Listen to how the notes compare to the original.

- Do they move in the same direction?
- Do they move the same distances?
- Are they shifted higher or lower overall?

Describe the types of graph transformations.

- What is a translation?
- What is a stretching?
- What is a reflection?
- What is a shrinking?

With your group, talk about how these transformations would sound when applied to a melody.

Determine the equation for the transformation by listening to the CD several times.

Listen to the major scale for reference if this will help you.

- How do the first notes of each melody compare?
- How many scale steps higher or lower are they?
- Are there common notes between the melodies?

Compare specific notes in their melodic sequences. For example, if a stretching transformation creates the same note as a translation, you know that some number times that note equals some number plus that note.

Determine the equation for the transformation by using numbers.

Use the tools on your Answers and Calculations worksheet to assign numbers to the melodies, check the estimations you made by ear, and find the exact equation for the transformation.

Use in/out tables, graphs, or another method.

Explain how you determined the equation.

For each transformation of the original motif, show all your work and explain in words the strategy you used.

Game 1

Transformation	CD track	Transformation equation	What to listen for in the transformation
1	49	$y = f(x) + 2$	Relative distances and the direction are the same, but overall it is higher in pitch. The first note is two notes higher than the first note of the original. The second note is the same as the third note of the original.
2	50	$y = 2f(x)$	Relative distances are greater, but the direction is maintained—the original has been stretched. The second note is the same as the third note of the original.
3	51	$y = -f(x)$	Relative distances are the same, but the direction is opposite. The fifth note (pitch value 0) is the same as the fifth note of the original.
4	52	$y = 2f(x) + 2$	Relative distances are greater, direction is maintained, and it is higher in pitch overall. The fifth note is two pitches higher than the fifth note of the original, which has a pitch value of 0.

Game 2

Transformation	CD track	Transformation equation	What to listen for in the transformation
1	53	$y = f(x) - 4$	Relative distances and the direction are the same, but it is shifted lower in pitch. The fourth note is the same as the third note of the original.
2	54	$y = 2f(x) - 3$	Relative distances are larger, the direction is the same, and it is shifted lower in pitch. The last notes are the same.
3	55	$y = -f(x) + 10$	Relative distances are the same, the direction is opposite, and it is shifted higher in pitch overall. The second note is the same as the second note of the original.
4	56	$y = -2f(x) + 12$	Relative distances are larger, the direction is opposite, and the pitches are shifted higher. The last note is the same as the fourth note of the original.



Game 3

Transformation	CD track	Transformation equation	What to listen for in the transformation
1	57	$y = -f(x)$	Relative distances are the same, and the direction is opposite. The fourth note is the same as the fourth note of the original.
2	58	$y = f(x) + 6$	Relative distances and the direction are the same. The pitches are shifted higher. The fifth note is the same as the seventh note of the original.
3	59	$y = 3f(x)$	Relative distances are much larger, and the direction is the same. The third note is the same as the first note of the original. The fourth note is the same as the fourth note of the original.
4	60	$y = -2f(x) + 8$	Relative distances are larger, and the direction is opposite. The fourth note is not the same as the fourth note of the original.

Game 4

Transformation	CD track	Transformation equation	What to listen for in the transformation
1	61	$y = -f(x) + 6$	Relative distances are the same, but the direction is opposite. The starting note is the same as that of the original.
2	62	$y = 2f(x) - 3$	Relative distances are greater, and the direction is the same. The starting note is the same as that of the original.
3	63	$y = 4f(x) - 6$	Relative distances are very much larger, and the direction is the same. The third, sixth, and seventh notes are the same as those of the original.
4	64	$y = -2f(x) + 9$	Relative distances are larger, and the direction is opposite. The first two notes are the same as the original.