

Speaker:

Name: Susan Robinson

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Position: Mathematics Teacher/ Curriculum Coordinator

Title: Beautiful Math Moves: Dancing the Transformations

Intended Audience: High School

Type of Presentation

Preferred: Long Presentation (60 minutes)

Description:

Drawing from the idea that physical experience changes how we process information, I have worked with a dance teacher to create a dance/math class that explores the language of transformations of functions using our bodies.

Beautiful Math Moves: Dancing the Transformations starts in Precalculus 11 when I take my classes outside to map out a representation of a quadratic function. In the classroom, any time a new function is introduced, we become the function and figure out how to illustrate different curves using our bodies. By Precalculus 12, most of my students are familiar with using their bodies to map out functions, and are comfortable moving into the dance studio.

We need to feel the mathematics before we describe it, so we start working with transformations in the dance studio. This embodiment of mathematics allows the students to make it personal before we move to abstraction. Math becomes less of something that is done in our heads, and more of something that is all around us.

The dance class starts with a warm up designed to introduce the students to the ideas of expansion and compression. Throughout the warm up we focus on counting the repetitions, changing the counts as we progress through the movements. This is also an opportunity to discuss frequency, which is later related to horizontal compressions and expansions of sinusoidal functions. Following the warm up, we play games with shapes and practice moving through space, all the time focussing on the idea of expanding/compressing into and away from our body's core.

The class is a dance class, with math being discussed. We finish the class by having students work in groups to create an actual dance featuring expansions and compressions. As the groups are practising, the dance teacher and I move throughout the room, planning on how to incorporate the individual dances into an entire piece. We run through the dance several times, performing for an imagined audience.

After the dance class, we spend time mapping out functions on a grid as a group. We link arms and form different curves, expanding and compressing away from either axis, or both of them at the same time.

Later, when we are considering operations on algebraic functions, we map out functions and try to step into the correct positions to show what would happen if we add a linear function and a square root function, or what might happen if we take the square root of a quadratic function.

Throughout the activities, many questions come up about the mathematics that don't typically emerge in a math class. There is a possibility to explore our senses and emotions: Why are we quiet when compressing and noisy when expanding? What emotions are associated with expansions versus compressions? This brings math into the realm of the subjective for students, many of whom associate mathematics with only the objective. We play, create and improvise, things that I want the students to bring with them from the studio into the classroom.