



BIG-PICTURE MATHEMATICS CONCEPTS IN MATH IN YOUR FEET

Excerpted principles from Principles & Standards for School Mathematics by the National Council of Teachers of Mathematics (NCTM)

REASONING & PROOF

“Reasoning and proof should be a consistent part of students’ mathematical experience in prekindergarten through grade 12. Reasoning mathematically is a habit of mind, and like all habits, it must be developed through consistent use in many contexts.” Page 56

The overall structure and specific lessons plans created for Math In Your Feet were developed to, above all, promote **critical thinking** and **connection making**. The creation of the program was guided by NCTM standards, upon which individual state curriculum and more detailed state standards are based.

PROBLEM SOLVING

“By learning problem solving in mathematics, students should acquire ways of thinking, habits of persistence and curiosity, and confidence in unfamiliar situations that will serve them well outside the mathematics classroom. In everyday life and in the workplace, being a good problem solver can lead to great advantages...Problem solving is an integral part of all mathematics learning, and so it should not be an isolated part of the mathematics program.” Page 52

In Math In Your Feet, problem solving and the creative process are linked and woven into every lesson. Students learn to think of themselves as both choreographers and problems solvers as they work to create their own dance patterns. Through this process, students begin to think mathematically as they choose from movement variables and transform their patterns using symmetry.

COMMUNICATION

“Communication is an essential part of mathematics and mathematics education. It is a way of sharing ideas and clarifying understanding...Because mathematics is so often conveyed in symbols, oral and written communication about mathematics is not always recognized as an important part of mathematics education. Students do not necessarily talk about mathematics naturally; teachers need to help them learn how to do so...Reflection and communication are intertwined processes in mathematics learning.” Pages 60 + 61

In Math In Your Feet, students are directed to reflect on their learning through daily journal prompts and word study. Daily literature connections present challenging math concepts in everyday language. In their workbooks, students are also guided to find the right terminology to describe the movement, direction, and foot placement variables in their dance patterns, as well as the words to describe their symmetry and sequencing choices. Math terms come to life as they are applied to and used to describe real-world situations.

ALGEBRA

Students need to understand the concepts of algebra, the structures and principles that govern the manipulation of the symbols, and how the symbols themselves can be used for recording ideas and gaining insights into situations.” Pg.36

In Math In Your Feet, students connect the abstract world of symbols to their concrete experiences in dancing. By creating their own symbolic language and graphs to record their dance patterns, they are then more able to understand the use of standardized mathematic symbology.

GEOMETRY

“Geometric ideas are useful in representing and solving problems in other areas of mathematics and in real-world situations, so geometry should be integrated when possible with other areas. Geometric representations can help students make sense of area or fraction...and coordinate graphs can serve to connect geometry and algebra. Spatial reasoning is helpful in using maps, planning routes, designing floor plans, and creating art. Students can learn to see the structure and symmetry around them.” Page 41

In Math In Your Feet, the physical world of dance is described using the language of mathematics, specifically geometry. Students explore directions, degrees, shapes, symmetry, and other geometric concepts both kinesthetically through dance and visually on the pages of their specially designed workbooks. Students learn and create dance patterns that they then learn to describe using mathematic terminology.

REPRESENTATION

“The term representation refers to both process and to product – in other words, to the act of capturing a mathematical concept or relationship in some form and to the form itself...Representation should be treated as essential elements in supporting students’ understanding of mathematical concepts and relationships; in communicating mathematical approaches, arguments, and understandings to one’s self and others...and in applying mathematics to realistic problem situations through modeling...Research indicates that students of all levels need to work at developing their understandings of the complex ideas captured in conventional representation.” Page 67 + 68

In Math In Your Feet, the concrete experience of moving and manipulating one’s body and feet to create patterns is captured using the abstraction of symbolic and graphic representation. Dance is a physical language, the elements of which can be described using the symbolic language of mathematics. The idea that math is a tool for communication can be an empowering experience for students, opening up pathways of understanding that were previously blocked by confusion around conventional mathematical representation.

CONNECTIONS

“When students can connect mathematical ideas, their understanding is deeper and more lasting. They can see mathematical connections in the rich interplay among mathematical topics, in context that relate mathematics to other subjects, and in their own interests and experience. Through instruction that emphasizes the interrelatedness of mathematical ideas, students not only learn mathematics, they also learn about the utility of mathematics.” Page 64

The world our students live in is complex and interrelated. Math In Your Feet provides a learning environment in which connections are made between two seemingly different areas of human life – dance and math. Through hands-on experience, the meaning and methods in both disciplines become clearer.