



FROM SIGHT TO SOUND

Artists of all types—musicians, poets, painters, sculptors—sometimes get their inspiration from abstract sources that don't seem to have anything to do with their art. Composers write music to communicate things that don't have sound, such as emotions, colors, or natural landscapes. For example, the record "Dark Side of the Moon" by the rock band Pink Floyd uses music to create images of planets rotating in space. Painters often try to express visually things that can't be seen, such as smells, sounds, or emotions. What are these artists thinking or doing to create these effects?

Let's look at painting, for example. If a painting is successful as a piece of art, it can make us feel a wide range of emotions—excitement, peace, anger, frustration, love, victory, despair, you name it. It can even make us feel as if we are in a faraway place and bring to mind all the sights and sounds of that place. In many cases the way this is accomplished is abstract and difficult to analyze. Painters learn their craft, experience the subject, and then express themselves on the canvas—and somehow, the pictures have the same emotions or feelings as the subject. What do you think would happen if a musician did the same thing? Suppose a musician wrote a piece of music and a painter painted a picture, each depicting a fish. What do you think the painting and the music would have in common? The painting may be straightforward—it would look something like the fish. But what about the music? It's natural to try to find a system that makes us think of a fish when we hear the music. We want the sound of the music to fit the fish somehow. Is there some process that can be used,

other than just feeling and interpretation, to make this happen?

If we look deeper, we can see that the fish has a basic structure that can be measured and transferred to both the music and the painting. In the activity Inside Out, you will use a mathematical interface to connect the world of sight to the world of sound. An *interface* is something that acts as a common link between two different systems, sort of like a translator who helps two people who speak different languages understand each other. In a way, our example involves saying *fish* in two different languages: one with music (sound) and one with a drawing (sight). An interface can also be thought of as a secret code. The shape of the fish can be measured and converted to a code. The code can then be converted to music so that the music has many of the qualities of the fish.

You might be wondering whether artists really use mathematics as an interface in this way. Quite simply, some do, some don't, and some do without being aware of it! Many would argue that using mathematics to compose music this way is artificial and lacking in soul. Other musicians have devoted their lives to developing mathematical methods for writing music. For the most part, artists of all types swing between thinking mathematically or technically and working from pure inspiration when they create. In Inside Out, you will explore a mathematical approach. You will experience a way that mathematics can reveal the music contained within the forms of physical objects.