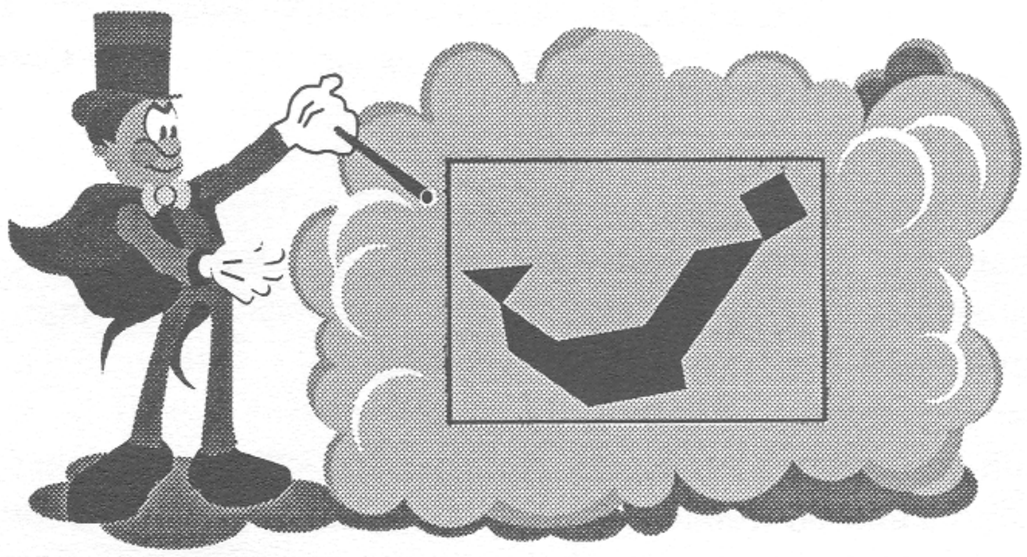
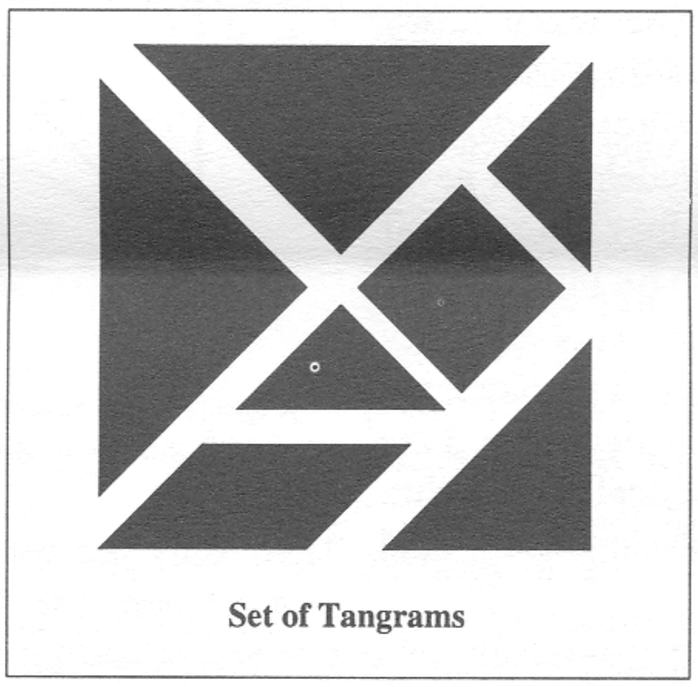
The Tangram Magicians

by Eric Simonian



During a Rhode Island College course on Alternative Assessment in the fall of 1994, I was paired with a second and a fourth grade teacher to plan a group project. I was teaching a geometry course for 10-12th grade students at the time. Somehow, we began talking about using tangrams (which the other teachers had worked with for years). The more we talked, the more nervous I got—I had never worked with tangrams before. But I was willing to give it a shot. I suggested getting together with them so that I could learn more. Then, one of the elementary school teachers had a brainstorm. She suggested that we put our students together—she wanted to see how different age groups interacted on an unfamiliar problem.

I was to read the students a story, *The Tangram Magician*[1], about a magician who could become anything or anyone he wanted to become, illustrated with tangrams. The last page of the story is left blank: it was up to the students to figure out what the magician would become next and create it with the tangram pieces. We decided to assign the students randomly to groups of six, each with two high school students, two second-graders, and two fourth-graders. We held the "event" at my school's library (we were all in different districts).



Set of Tangrams

The high school students didn't like the activity at first: their initial comments were "I can't do this," or "It's too hard to think"! But after seeing the younger students dive right in, and getting the idea, they started to have fun, and became much more enthusiastic. Interestingly, there were no significant differences in the types of designs the students made, although the older students were in fact more inhibited and slower to create their designs. (See p. 12 for one of the students' designs.)

Since my students knew as little about tangrams as I did, in order to prepare for the visit, they spent three days working in pairs solving puzzles with tangrams. In addition, I had them keep a journal recording their day-to-day thoughts, before and after the visit. The results were fascinating. Many of my students were not looking forward to the visit, but changed their minds quickly afterwards. Some of them reported that during the activity they felt that the elementary school students were smarter than they were, since they were able to solve the puzzles so quickly. Eventually, however, they realized that the younger students were simply much freer in using their imaginations, and how useful this was in solving problems.

My hope was that the activity would help my students in our work with proofs. It did—though indirectly. As I realized later, visual imagination is very important in creating geometry proofs: you need to "see" which triangles might be similar or congruent before you try to prove such facts using "rules." This is exactly the type of imagination you need to work with tangrams, the ability to "see" how you might construct a figure before you try to put the pieces together.

I had also noticed that my geometry students had a difficult time writing down the steps for proofs. They did not see the need for the steps that they had left out—even after these were pointed out to them. I decided to try another tangram activity, hoping that I could get them to see how important writing and following instructions can be. The students were seated across from one another but separated so that they could not see each others' work space. Each student was to design a tangram picture and write a series of (seven) steps that, if followed correctly, would enable the other student to replicate the design. Students were assessed both on how well the steps were written and how well they were followed. Again, I had them keep a journal on the activity. I was pleased with the results: they seemed to realize quite soon that writing and listening were extremely important skills and that terminology was equally important (some of them took quite a bit of time to get "left" and "right" worked out while sitting opposite each other!).

These tangram activities worked exceptionally well for teaching visualization and communication. For doing mathematics, students need many more such activities—in which they must both use their imaginations and think analytically. ❖

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[1]by Lisa Campbell Ernst and Lee Ernst, Harry N. Abrams, NY
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