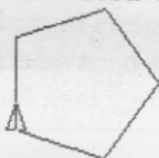


Math Tool Synergy: Angles of Polygons from Multiple Perspectives

by Ihor Charischak

The title was inspired by a new NCTM publication called "Geometry from Multiple Perspectives" which is an attempt to illustrate how two software programs can be used together synergistically to enhance learning. It also adds another perspective to the article (Total Turtle Theorem Revisited) in last spring's CLIME News (V. 4.2). In that article a student learned how the Total Turtle Trip Theorem helped her draw any polygon she wished. What follows is what might have happened the next day - with commentary by the teacher.

The teacher is in the computer lab at a demonstration station where he will be using a computer and projection tablet to review an idea about exterior angles of a pentagon. The students are sitting in groups each with their own computer. The teacher has on the screen the following:



repeat 5 [fd 50 rt 72]

He's about to have a conversation with a student. Let's listen in.

T: What can you tell me about the exterior angles of this pentagon?

S (Sara): I don't know what you mean. I don't see any exterior angles. All I see is 5 interior angles.

TT (Teacher thinks): I thought she understood this yesterday. I did "teach" it to her. Should I scold her? No, that won't work. Oh well, back to my constructivist drawing board.

T: So you see 5 interior angles. What can you tell me about them?

S: They're all equal. And they measure 72 degrees.

T: Are you sure?

S: Yes, it's right there. (She points to the RT 72 on the screen.)

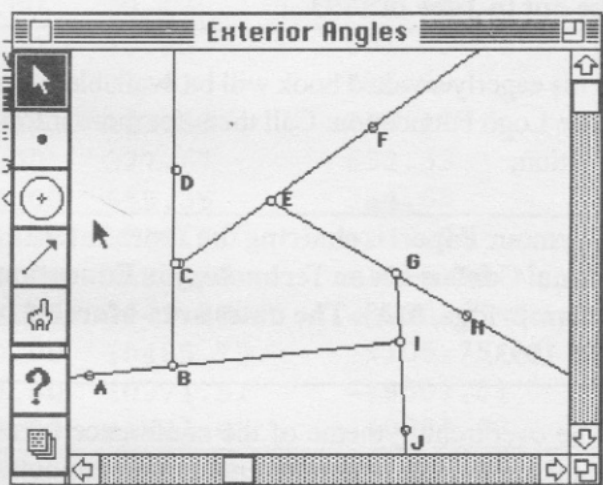
*Henri Picciotto used this expression in a recent talk.

TT: I could go through the same explanation I did yesterday. Or....I could try a different approach. Hmmmm....Let me see.

T: Before I answer your question, let's do a different activity.

This activity involves a computer program called the Geometer's Sketchpad. It asks the student to do the following with the Sketchpad:

1. Choose a polygon. (We'll assume the choice is a pentagon.)
2. Construct rays AB, BC, CE, EG, and GI to form a convex polygon.
3. Construct points on each ray.
4. Use the measure tool to determine the measure of each exterior angle.
5. Calculate the sum of these angles.



6. With the pointer tool change the angles of the pentagon by dragging on one of the vertices. What happens? What conclusions can you make?

For the next few minutes the students work in groups on the problem. Next each group reports their findings. After hearing the reports of the groups, Sara ponders the results.

S: Hmmmm...the sum is always 360 and it doesn't matter what the polygon is. The exterior angles of a convex polygon add up to 360. But why does that work?