Tangram Fractions

Find the fractional part each tangram piece is of the whole (all 7 pieces). Be sure to explain your reasoning.

Grade Levels 6 - 8

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Context

I gave this assessment to my students before we formally worked with fractions, although I knew they had studied fractions in previous grades. I wanted to get a feel for which students had a conceptual understanding of a fraction and how it relates to the whole. You will notice that the task description does not mention the names of any of the pieces. This allows students to increase their use of mathematical language by naming the pieces in their solution.

What This Task Accomplishes

One purpose for assessment is to make instructional decisions. This task allows the teacher to plan for future units on fractions. The teacher will better be able to decide what appropriate activities students will need to develop a broad understanding of fractions. This task also looks at a whole that is divided into pieces that are not the same size. The more students can play around with different concepts of "whole" and "parts" the better their understanding of fractions will be.

What the Student Will Do

Most students will spend time trying to make one polygon out of the seven shapes (limit time for this task). Some students work with the smallest triangle as the unit (1/16) and name the other polygons from that. Others will compare the other pieces to the big triangles, which are 1/4.

Time Required for Task

50 minutes

Interdisciplinary Links

This is a mathematics task.

Teaching Tips

Encourage students to share with a partner the polygon they make with the seven pieces (or hand out the square solution to students who have unsuccessfully completed the whole in a sufficient amount of time). Some students get overly frustrated with making the "whole" that

they do not get a chance to think about the fractional parts.

Suggested Materials

- Tangrams
- Graph paper

Possible Solutions

Large triangles are 1/4

Medium triangle is 1/8

Small triangles are 1/16

Square is 1/8

Parallelogram is 1/8

Benchmark Descriptors

Novice
Inappropriate concepts are applied. There is no evidence of a strategy. There is no evidence of mathematical reasoning. There is no explanation of a solution. There is also some inappropriate use of mathematical language (volume of one whole).

Apprentice
There is no explanation of a strategy, but some evidence of reasoning (the big triangles are correct, and separately the other pieces are in proportion to each other). The student uses a strategy that is only partially useful. There is some reasoning, but it is isolated from the problem (again the eighths are in proportion to each other, but not the whole). The student shows an Incomplete explanation and only some basic use of mathematical terminology is shown.

Practitioner
The solution shows that the student has a broad understanding of the problem and major concepts. His/her strategy leads to a solution and uses effective reasoning. There is a clear explanation with correct mathematical terminology.

Expert
The efficient solution shows a deep understanding of the problem (the student did not have to make the Tangram pieces into a bigger polygon). S/he verifies the solution ("This comes out to 16/16 or 1 whole.") and employs refined reasoning. There is a clear and detailed explanation. Mathematical representation is actively used as a means of communication. There is precise and appropriate use of mathematical terminology and notation.