Tangram Areas - *Grandfather Tang's Story*

Choose an animal from the story we read to recreate using your tangrams. Choose one of the tangram shapes to have an area of 1. Find the area of the entire animal. Choose a different tangram shape to have an area of 1. Find the area of the same animal. Compare the 2 areas and comment on the differences and/or similarities you found.

Be sure to document your work clearly and use accurate math language to explain your thinking.

Have Fun!

Grade Levels 3 - 5

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Context

My class has been participating in a geometry study. As part of the unit, I read aloud to them *Grandfather Tang's Story* by Ann Tompert. We had just completed some exploratory activities with tangrams and finding the area of triangles.

What This Task Accomplishes

This task allows me to see which students are able to apply their understanding of the area and geometry concepts we have studied. In some cases, it also served as a pre-assessment of their understanding of basic fraction concepts for our next unit.

What the Students Will Do

The students will begin by recreating their animal using the tangram pieces. Some students then traced the pieces to create a diagram of the animal on paper. Others jumped into finding the area of each of the pieces. When choosing the second piece to assign a value of one, many students repeated the process of using the tangrams to determine the area of each piece, rather than looking at the relationships between the two pieces assigned a value of one. Most students compared whole areas and then related the relationships between the whole areas to the relationship between the unit values.

Time Required for Task

Two, 45-minute periods

Interdisciplinary Links

This task was based on the book *Grandfather Tang's Story*. Students could create new shapes using the tangrams or another manipulative and write their own story. This also might serve as a springboard for a study of mosaics as an art form.

Teaching Tips

I created mini-reproductions of the animals in the story to assist the students in their animal selection. The background experiences students had with the tangrams was valuable, as was the work we did in our measurement unit in developing the concepts of area and units of measure.

Suggested Materials

- *Grandfather Tang's Story*
- Tangrams
- Paper tangrams (so that students can glue pieces directly on to their papers if desired)
- Rulers
- Animal shapes from the story

Possible Solutions

All the animal shapes will have the same area when assigned a common piece as having a value of one. If the small triangle is assigned an area of one, the animal will have an area of 16. If the square, parallelogram or medium triangle is assigned an area of one, the animal will have an area of eight. If the large triangle is assigned an area of one, the animal will have an area of four. Students will make a variety of observations and comparisons.

Benchmark Descriptors

Novice
A Novice solution will demonstrate a limited understanding of the task. The student may not be able to find the areas of some of the tangram pieces, not find the value of the shape as a whole or not realize that every piece has a value based on its area. The student's explanation of the mathematics used to solve the problem will be unclear or limited.

Apprentice
An Apprentice solution will find the area of the animal using two different pieces as a value of one. The areas of the component pieces or the whole may be calculated incorrectly. The student may not compare the two areas or the comparison may not be mathematically based. The student's explanation of the approach used may be incomplete or have unclear parts.

Practitioner
The Practitioner solution will address all parts of the problem correctly. The method used to find the area of the animal will be explained and a mathematical comparison will be included. Labeled diagrams will probably be a part of this solution.

Expert
The Expert solution will correctly solve the problem and make a correct mathematical

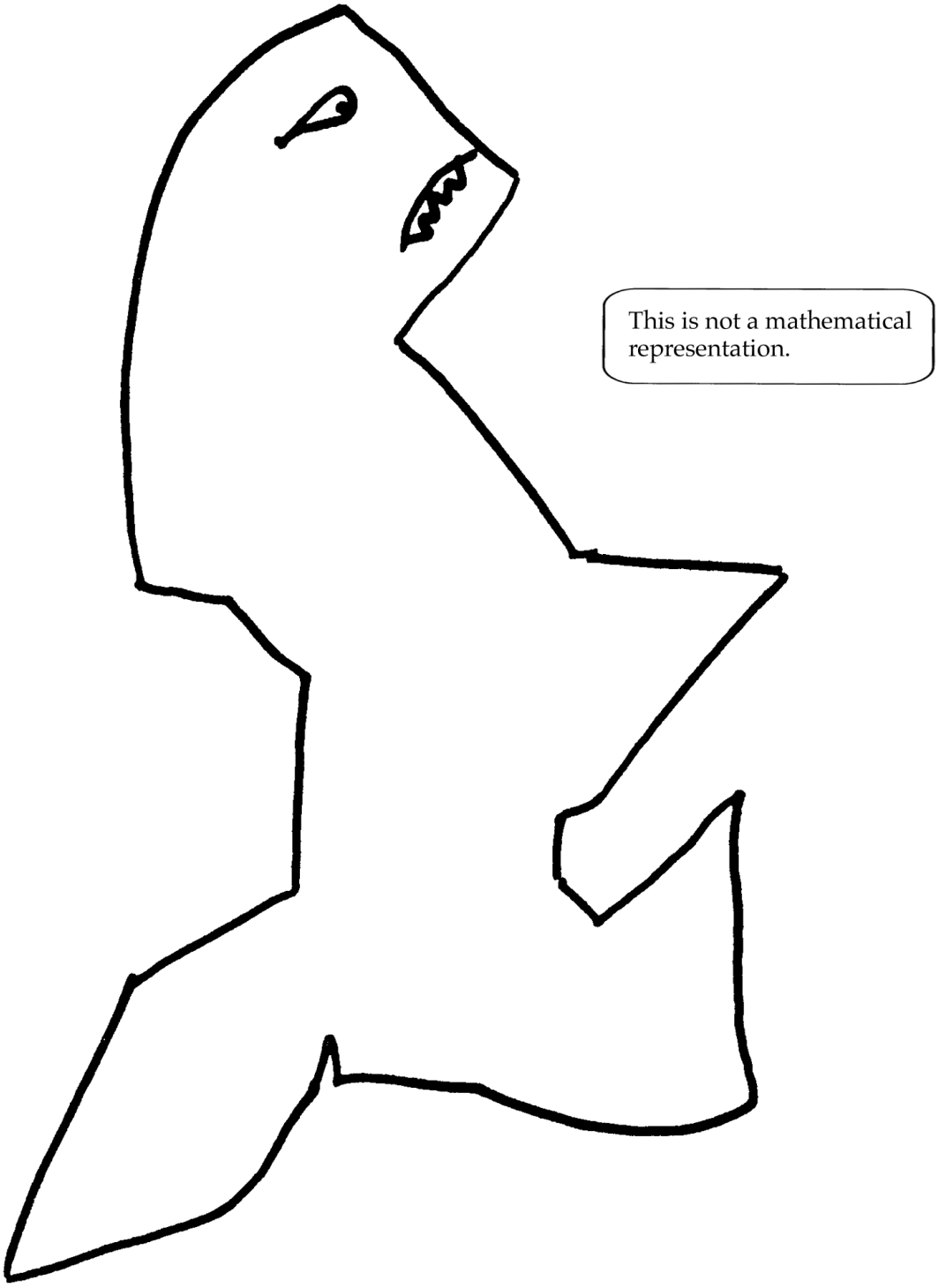
comparison. A comparison of the areas will include an analysis of the relationship between the wholes as well as the component parts. The student will communicate the solution clearly, linking equations and labeling diagrams.

Novice

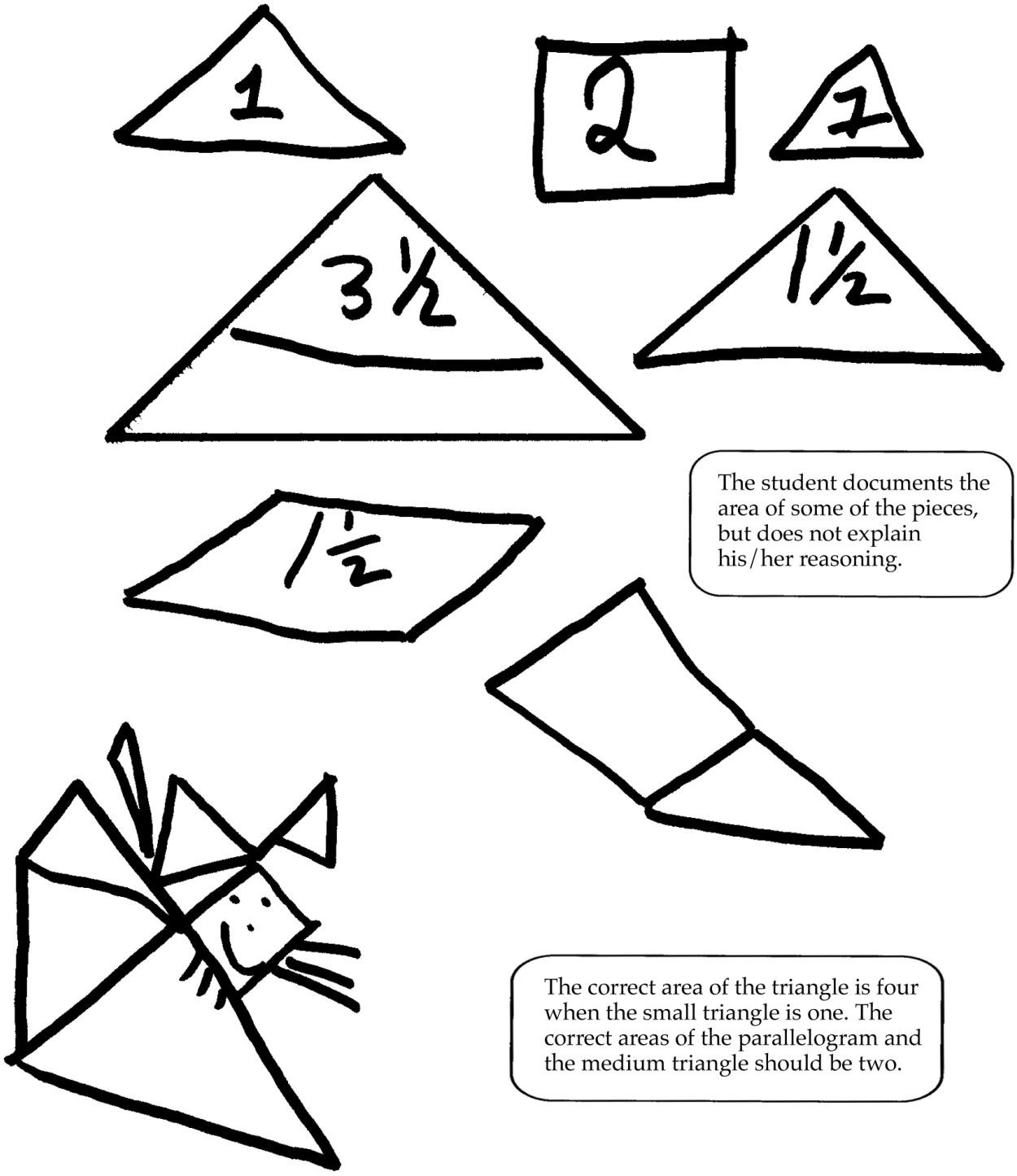
I had to figur out What the area was for my lion. I USed a Square and a triangle It Was 16 for the triangle And 3 for the Square. I think the Sqware was easyer to use because its higer. also becase more shapes make a Sqoare

The student does not document the strategy used or how "16" and "3" were calculated.

Novice



Novice



The student documents the area of some of the pieces, but does not explain his/her reasoning.

The correct area of the triangle is four when the small triangle is one. The correct areas of the parallelogram and the medium triangle should be two.

Apprentice

Grandfather Tang's Story

Choose an animal from the story we read to recreate using your tangrams.

fox

Choose one of the tangram shapes to have an area of one. Find the area of the entire animal.

st Δ 14 area

Choose a different tangram shape to have an area of one. Find the area of the same animal.

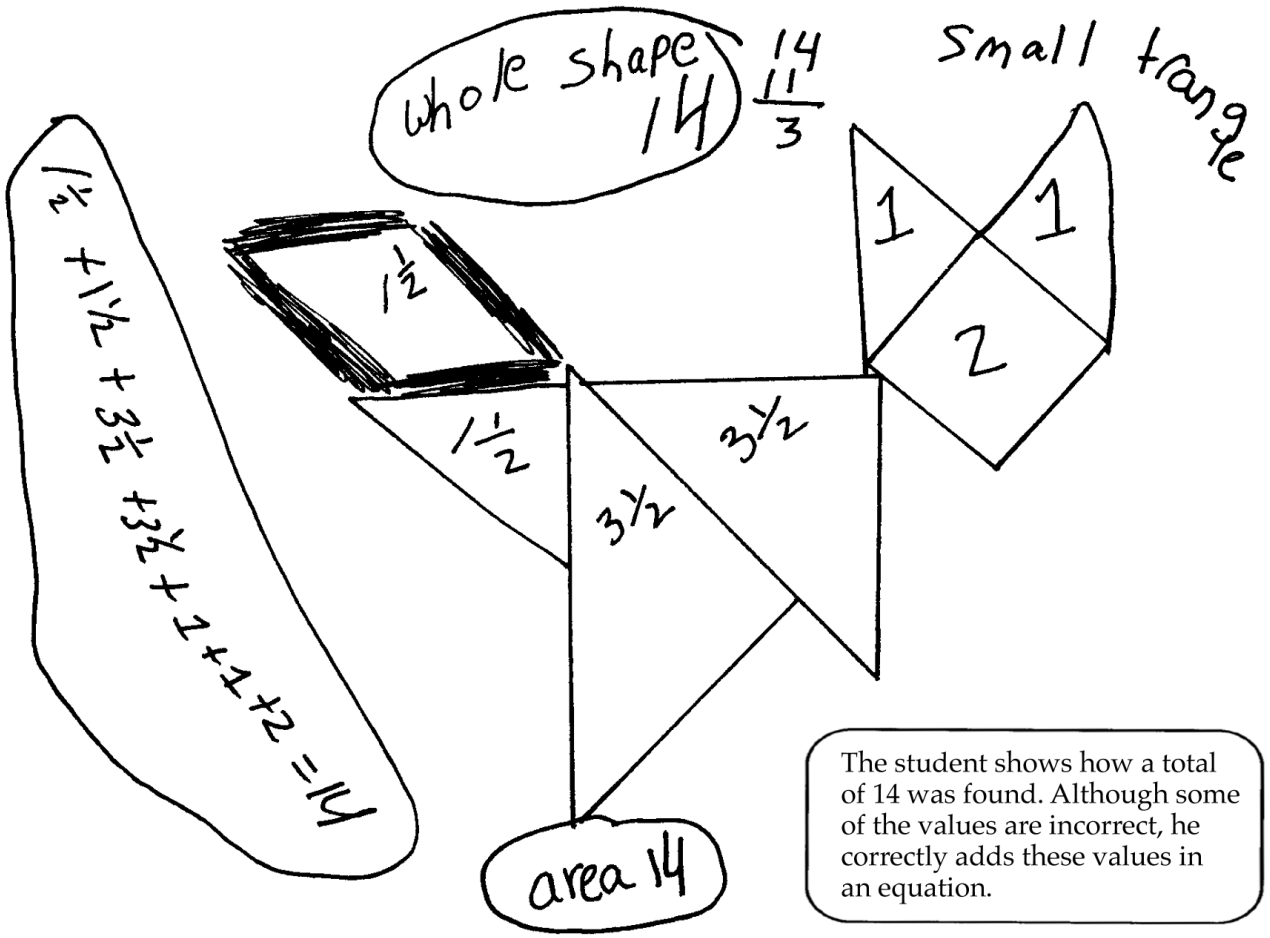
square □ 11 area

Compare the two areas and comment on the differences and/or similarities you found.

Be sure to document your work clearly and use accurate math language to explain your thinking.

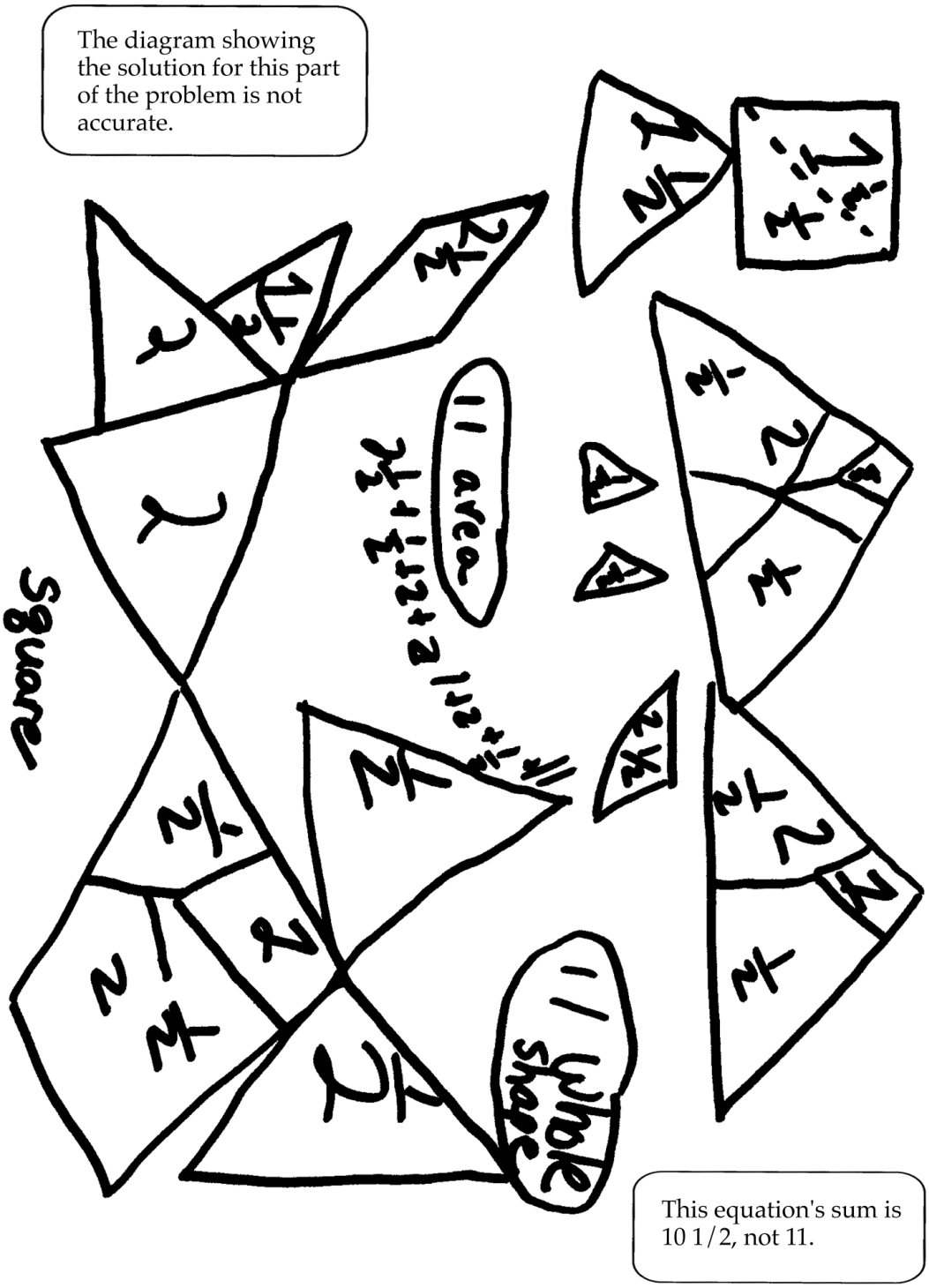
Have fun!

Apprentice



The student shows how a total of 14 was found. Although some of the values are incorrect, he correctly adds these values in an equation.

Apprentice



Apprentice

Different of the number is 3. The two numbers are 14 and 11. I got 14 with the small triangle and 11 with the square.

The same is I did not see the same thing In the small triangle and the square.

The student attempts to compare the areas.

Finding the difference between the two areas is not mathematically appropriate.

Practitioner

The student makes a mathematical comparison of the areas.

Grandfather Tang's Story

Choose an animal from the story we read to recreate using your tangrams.

crocodile 7

Choose one of the tangram shapes to have an area of one. Find the area of the entire animal.

8 squar 7

Choose a different tangram shape to have an area of one. Find the area of the same animal.

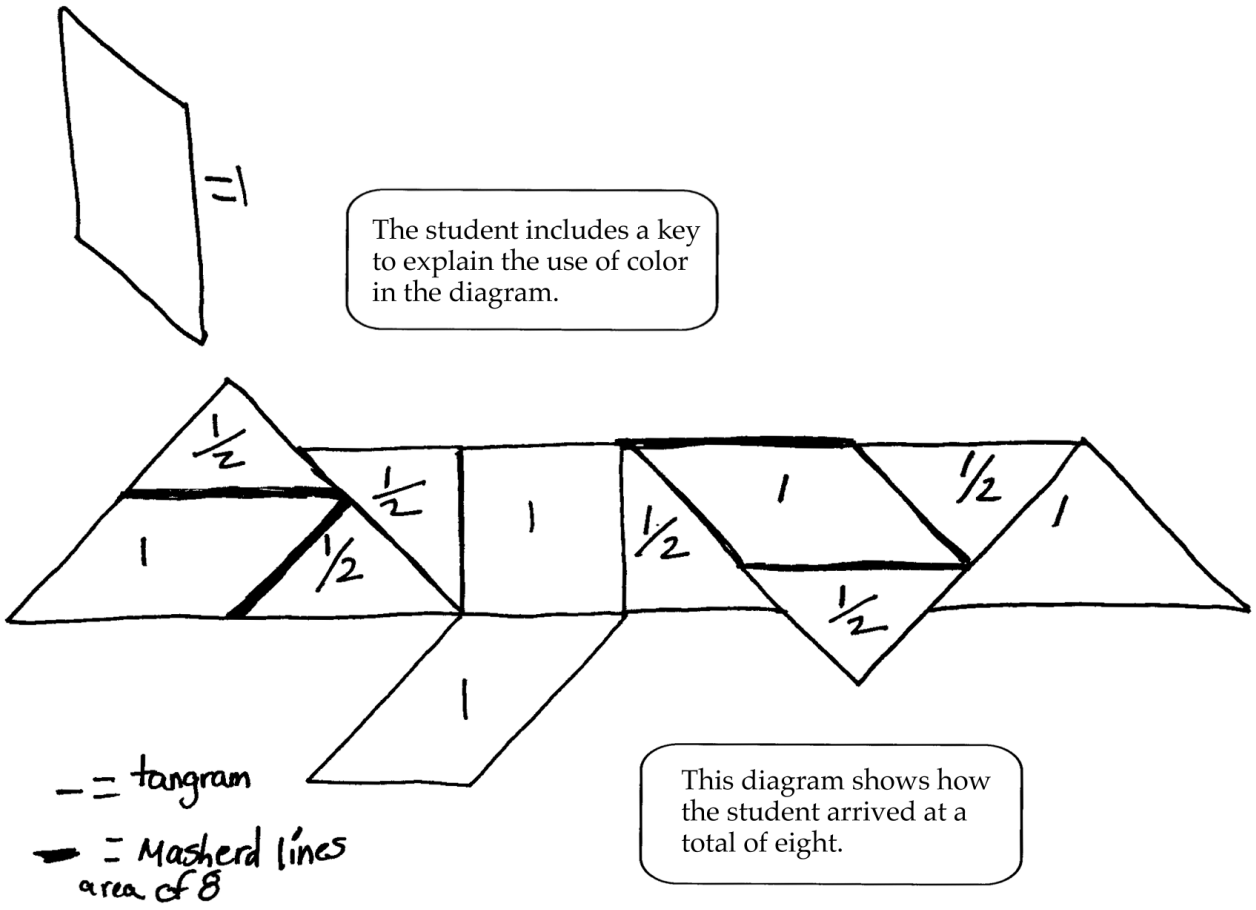
Compare the two areas and comment on the differences and/or similarities you found.

Be sure to document your work clearly and use accurate math language to explain your thinking.

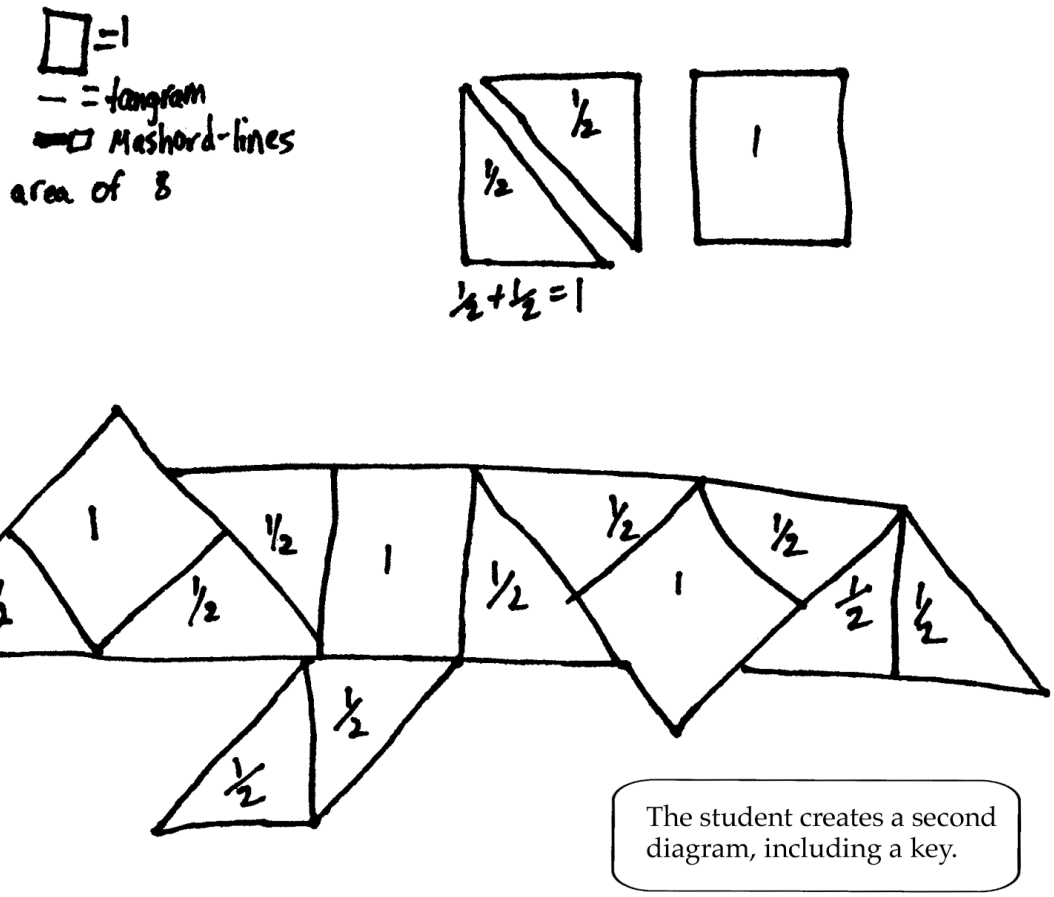
Have fun!

They both have a area of 8 because both the shapes I picked can fit both of the small trangils in them.

Practitioner

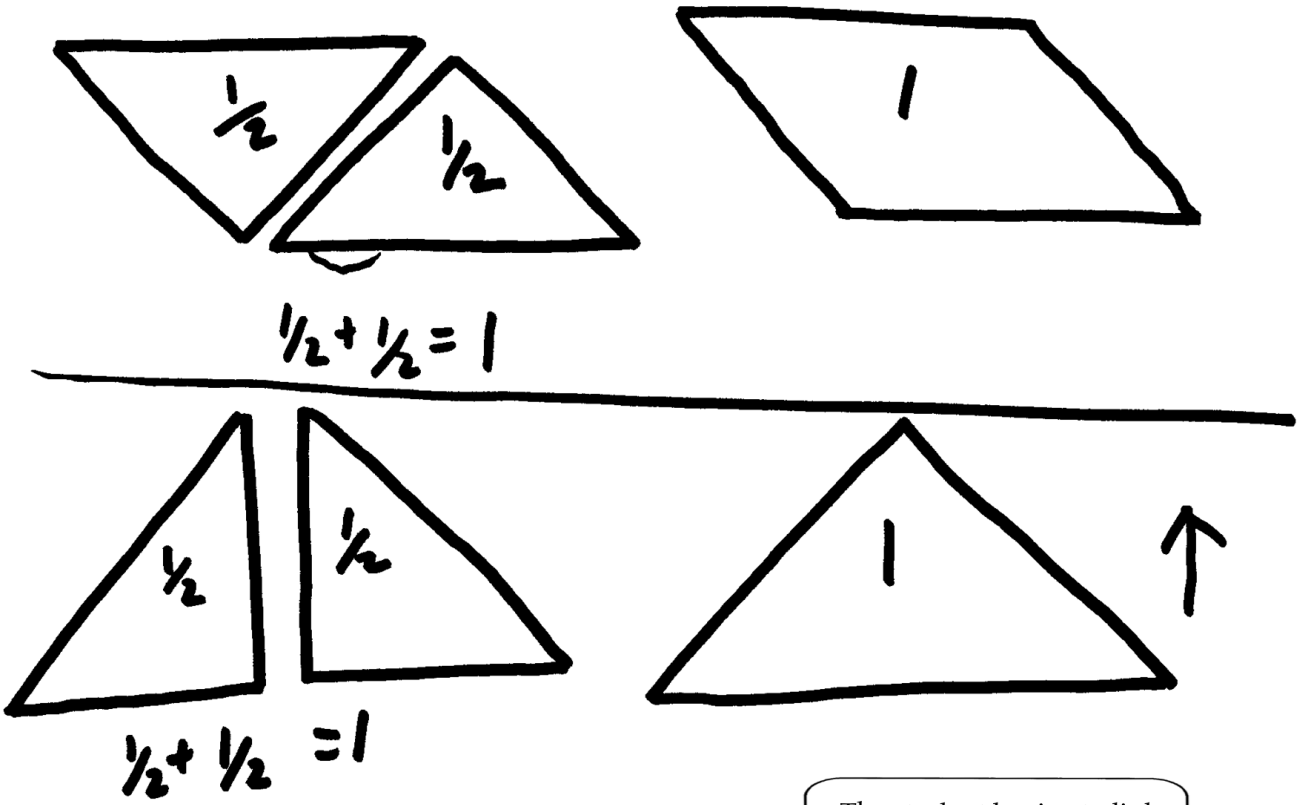


Practitioner



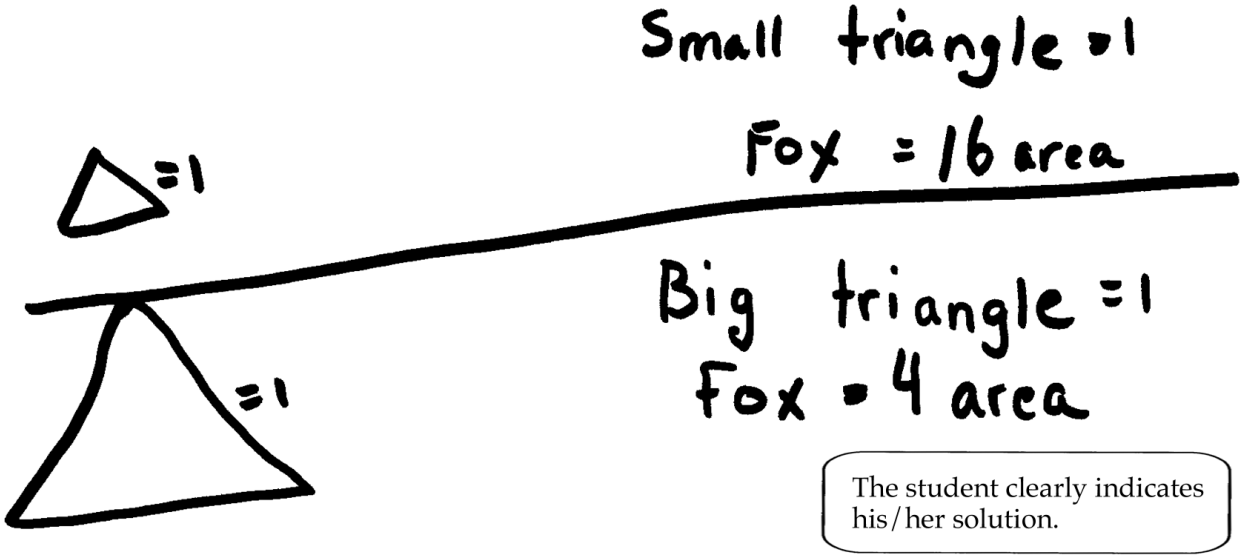
The student creates a second diagram, including a key.

Practitioner



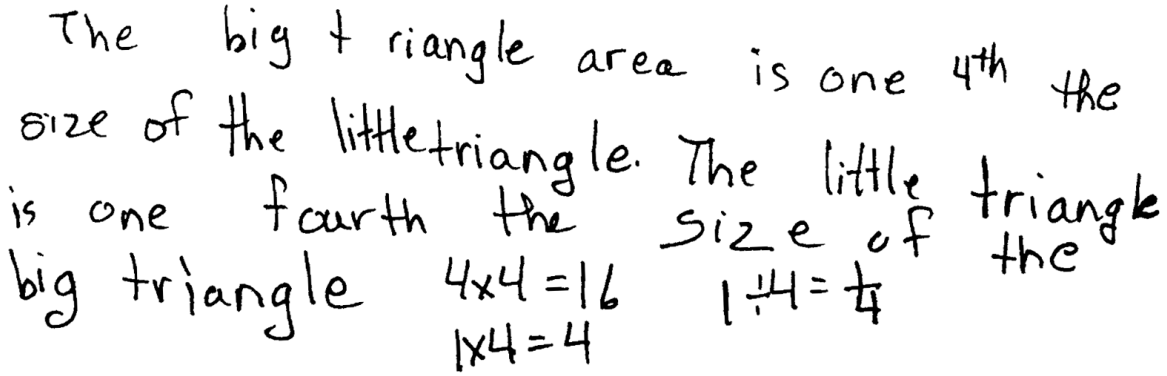
The student begins to link equations to the diagrams.

Expert



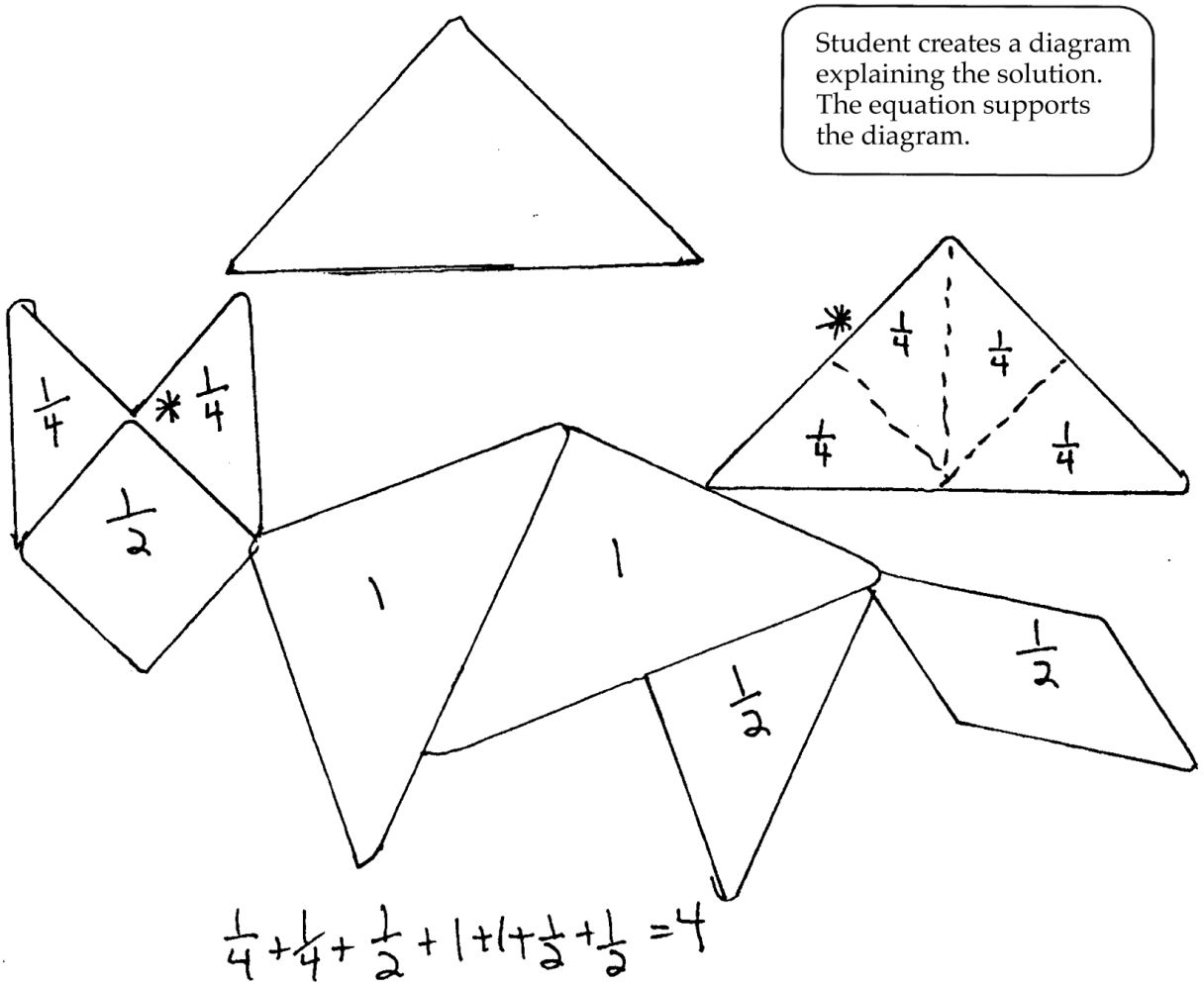
The student clearly indicates his/her solution.

Expert



The student compares the areas of the whole and shapes used as one. The comparisons are supported by equations.

Expert



Expert