

Tangram Money

If the small triangle is worth 25 cents, how much would the other tangram shapes (medium triangle, large triangle, square, parallelogram) be worth?

As you solve this problem, please be sure to explain your reasoning. Use as much math language as you can. Use diagrams to help explain your reasoning and when you think you are finished, go back and see if you can make some comments about any patterns you see.

Exemplars

Tangram Money

Suggested Grade Span

3-5

Task

If the small triangle is worth 25 cents, how much would the other tangram shapes (medium triangle, large triangle, square, parallelogram) be worth?

As you solve this problem, please be sure to explain your reasoning. Use as much math language as you can. Use diagrams to help explain your reasoning and when you think you are finished, go back and see if you can make some comments about any patterns you see.

Alternate Versions of Task

More Accessible Version:

If the green triangle is worth 25 cents, how much are each of the other pattern block shapes worth? Pattern blocks include: Orange square, red trapezoid, yellow hexagon, blue parallelogram and tan rhombus.

As you solve this problem, please be sure you explain your reasoning. Use as much math language as you can. Use diagrams to help explain your reasoning and when you think you are finished, go back and see if you can make some comments about any patterns you see.

More Challenging Version:

If the small triangle is worth 25 cents, how much would the other tangram shapes (medium triangle, large triangle, square, parallelogram) be worth?

As you solve this problem, please be sure to explain your reasoning. Use as much math language as you can. Use diagrams to help explain your reasoning and when you think you are finished, go back and see if you can make some comments about any patterns you see.

If the large pair of triangles is each worth 25 cents, determine the value of the other shapes.

Context

This task can be given to students with some familiarity with tangram pieces as an assessment to see if they understand the relationships between the pieces. It can also be given to students as an introduction to tangrams.

Exemplars

What This Task Accomplishes

This task allows students to see the relationships between polygons. Connections can be made to area. Tangram shapes worth the same amount will have the same area and polygons with different shapes can have the same area.

What the Student Will Do

As students solve this problem, they will be using money symbols (notice the problem does not use a cent sign, dollar sign or decimal points, so you can assess the student's use of money notation). The problem encourages students to use mathematics language (names of polygons, money notation, equations) and mathematics representation (tracing tangram polygons) to help explain their reasoning.

Time Required for Task

45 minutes

To explain the task and have students work and write up solutions. If this is to be used before students work extensively with tangrams, allow at least 15 minutes for students to "play" with the pieces so they will be ready to "work" with them in solving the problem.

Interdisciplinary Links

Tangrams are an old Chinese puzzle. Work with tangrams can be coordinated with a unit on China. The task can also be used in conjunction with a social studies discussion on the real value of money.

Teaching Tips

If you want to use this as an assessment of problem solving or geometry, give the task to students before using tangrams extensively. But allow them some time to play with tangrams first.

Suggested Materials

- Tangram pieces (Tangrams can be purchased commercially or made from oaktag.)
- Unlined paper
- Pencils

Possible Solutions

This task has unique solutions, but allows an opportunity to use different strategies. The square, parallelogram and medium triangle are worth 50 cents, the big triangle is worth \$1.

Exemplars

More Accessible Version Solution:

Orange square: 50 cents
Red trapezoid: 75 cents
Yellow hexagon: \$1.50
Blue parallelogram: 50 cents
Tan rhombus: 25 cents

More Challenging Version Solution:

If the large triangles are worth 25 cents, then the medium triangle, the square and the parallelogram are each worth 12.5 cents, and the 2 small triangles are each worth 6.25 cents.

Task Specific Assessment Notes

Novice

This student has applied inappropriate concepts to the problem. S/he assumes that percent and money can be interchanged. S/he also has errors in his/her reasoning. S/he begins to assign the same small triangle a value of 20 percent and then 15 percent. S/he seems to be assigning values to the large triangle, medium triangle and parallelogram without much evidence of reasoning. S/he also has an error in his/her sum.

Apprentice

The solution is not complete. The student did not find the value of the medium triangle. If this were a teaching piece, the teacher would ask the student to complete the task.

Practitioner

The student uses a strategy that leads to a solution although that strategy is explained only through their representation.

Expert

This student shows a deep understanding of the problem. His/her solution uses the newly acquired information about the value of the square to solve the value of the big triangle. His/her explanation is clear and effective detailing how the problem was solved. His/her use of mathematics language is precise and appropriate. His/her mathematical representation helps communicate his/her reasoning.