Terrific Tiles

Mrs. McKegney wants to tile her kitchen floor. The tiles are 3 inches on each side. The floor is 10' x 15'. How many tiles does she need?

The tiles are sold in bundles of 10. Each bundle costs $3.50. How many bundles are needed? How much will she need to pay for the tiles?

Write a letter to Mrs. McKegney clearly explaining your solution to her tile problem and how you went about solving the problem. Be sure to include a visual representation of your solution and observations that you made.

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Grade Levels 3 - 5

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Context

This task was given to students as an assessment piece for a measurement unit they had just completed. Students were provided with direct instruction and exploratory pieces, which centered around measurement before tackling this task. A menu approach was provided to students so they would have a choice about which tasks they wanted to solve. This enabled me to provide tasks appropriate for my higher performing students, as well as my special needs students. There is an adapted version on the next page.

What This Task Accomplishes

This task assesses several measurement areas including students' ability to manipulate and solve problems involving measurement and money. It also provides an opportunity for students to practice computation skills in a meaningful context.

What the Student Will Do

Most students will begin by finding how many three inch tiles are in a foot and then will find how many feet will be needed in all. Another strategy that a student used was to find the total area needed and then divide by nine (the total area of each tile). Students will then proceed to figuring the total bundles needed and the cost.

Time Required for Task

3 hours

Interdisciplinary Links

When studying pottery and/or tiles, this task would fit in nicely. Many South American countries are famous for their art of tile making.

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Teaching Tips

It is important to provide students with the concepts and skills they will need to solve this task through direct instruction and exploration of concepts. Students need a lot of experience in finding area with many different manipulatives, including tiles. Students should also have experience converting measurements, such as inches to feet.

In order to address the diverse needs of my students, I adapted this task in the following way to meet the needs of my challenged students:

Terrific Tiles (An Adapted Version)

Mrs. McKegney wants to replace the rug in her classroom with tiles. The tiles are 6 inches on each side. The rug is 6' x 9'. How many tiles does she need? The tiles are sold in bundles of 5. Each bundle costs $1. How many bundles are needed? How much will she pay for the tiles?

Some students who need this version of the task also may require several other accommodations in order to be successful. For instance, one student in my class worked with an instructional assistant to manipulate 6" x 6" pieces of construction paper on a rug that is located in the classroom. After placing the "tiles" directly on the rug, this student numbered them, as s/he counted them and then put the tiles in piles of five. S/he then counted how many $1 piles s/he had. His/her instructional assistant took dictation of his/her response and s/he created a visual representation of his/her solution on graph paper.

For students who would not find the original task challenging, the task could be adapted so that students had to deal with fractional amounts, remainders and differing shapes of the area to be covered.

Suggested Materials

- Graph paper
- Tiles
- Rulers
- Calculators

Possible Solutions

2,400 tiles are needed.

240 bundles are needed.

Cost of tiles will be $840.

Benchmark Descriptors

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Novice
This student was unable to make progress toward a solution. The student attempted to manipulate the numbers presented in the task, but really had no comprehension of the situation.

Apprentice
This student had a novel approach (finding the total area and then dividing the total area by nine, the area of the tiles). This worked for part of the problem, but the student failed to find the number of bundles needed and the total cost. The student's communication is poor; making it difficult to decipher what was done. The student uses math terminology incorrectly several times.

Practitioner
This student had an approach that worked, relying on diagrams to formulate understanding of the mathematical situation. The student was able to find the total number of tiles needed, the total number of bundles and the total cost. The student also attempted to make a mathematically relevant observation. The communication was mostly clear, but the reader must fill in some parts, for instance, how 240 bundles were obtained. Student language was varied and included terms, symbols and notation.

Expert
This student immediately recognized that this was an area problem. The student proceeds directly toward a solution by calculating tiles per square foot and correctly applying multiplication and division algorithms. The student used good math language and gives reasons for key decision making.

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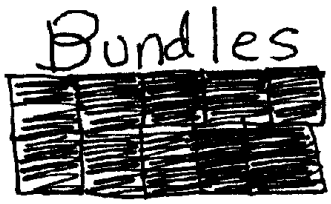
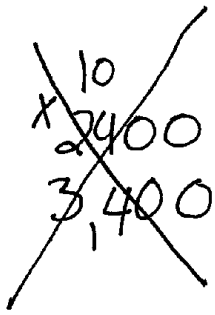
Novice



10 tiles

$3.50



This student is aware of the numbers involved in the task, but has no idea how to make progress toward a solution.

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Apprentice

Correct solution for part of the problem. The student does not address bundles and total cost.

Student has a difficult time clearly communicating what was done to solve the problem and the decisions they made along the way.

Dear Mrs McKeeny,
I Solved this by Maceing a $10ft \times 15ft = 150ft^2$ then a $3in \times 3in = 9in$. I did that because each tile was 3in by 3in so I made a 3 by 3in (square). Sower. then I mad a 12 by 12 ft then I did $144 \times 150 = 21,600$ sq in. then I divisioned $21,600 \div 9 = 2,400$ so that how many tiles She needed. this was sortof hard.
I decied to do a poster and dark coler ment 60 tiles and light Colers mean 40 tiles

2,400 tiles

Student uses some correct mathematical language, but also has many errors and inaccuracies.

This student's approach is novel, and does lead to a correct solution to part of the problem.

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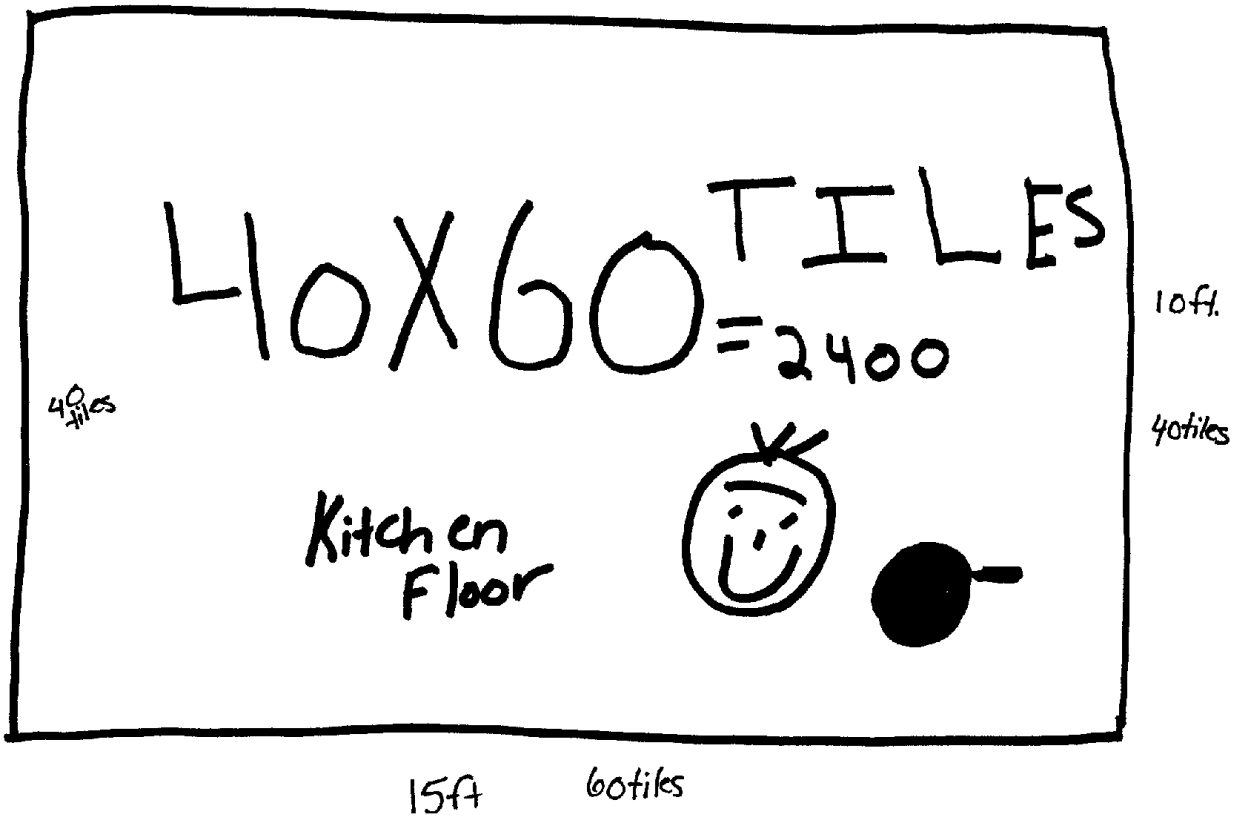
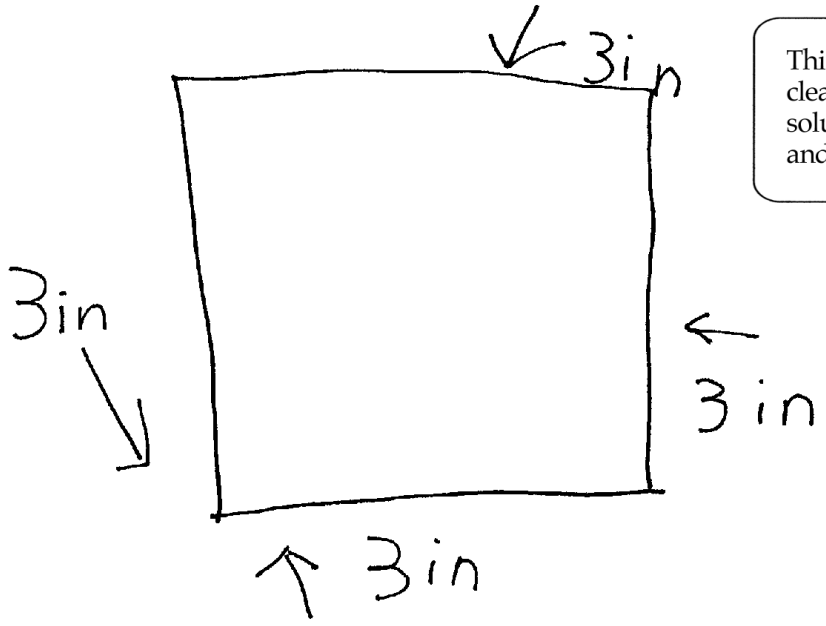
Apprentice





This representation could more clearly communicate the student's solution. We are unclear where 40 and 60 tiles come from.

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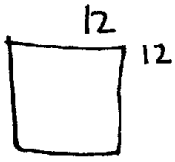
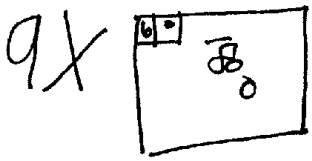
Apprentice



12X150f=1,800 Sq in

area in kinthin

The student makes an initial mistake of figuring the area of the kitchen as 12x15 instead of 10x15.



The student attempts to represent here that they will see how many nine's are in 1800, which would have worked if the initial computation was correct.

144X150 => 21,600Sq in

~~36X9~~ 324

Sq in
9X200 = 1,800 Sq. in

21,600÷9=2,400tiles

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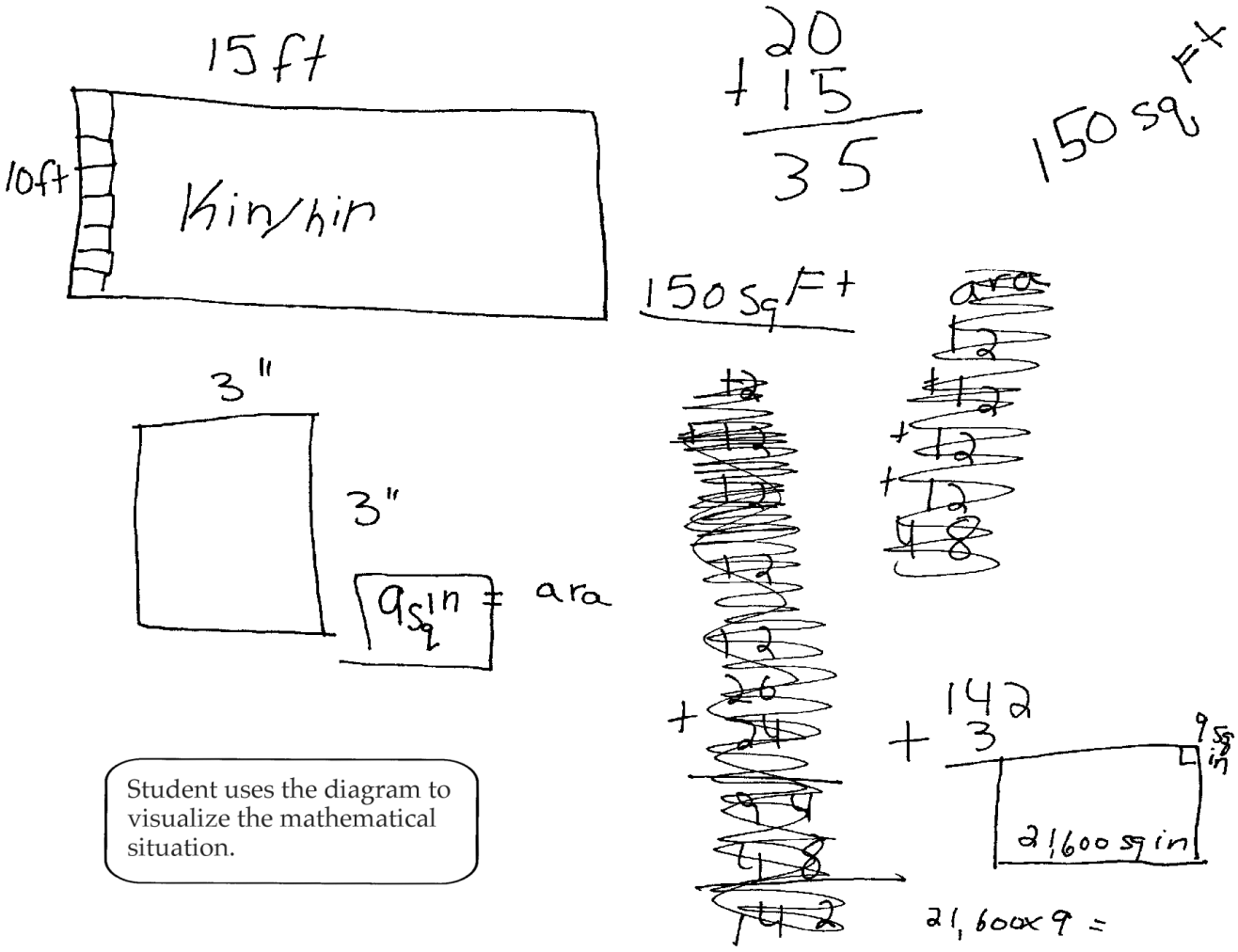
Apprentice



Student uses the diagram to visualize the mathematical situation.

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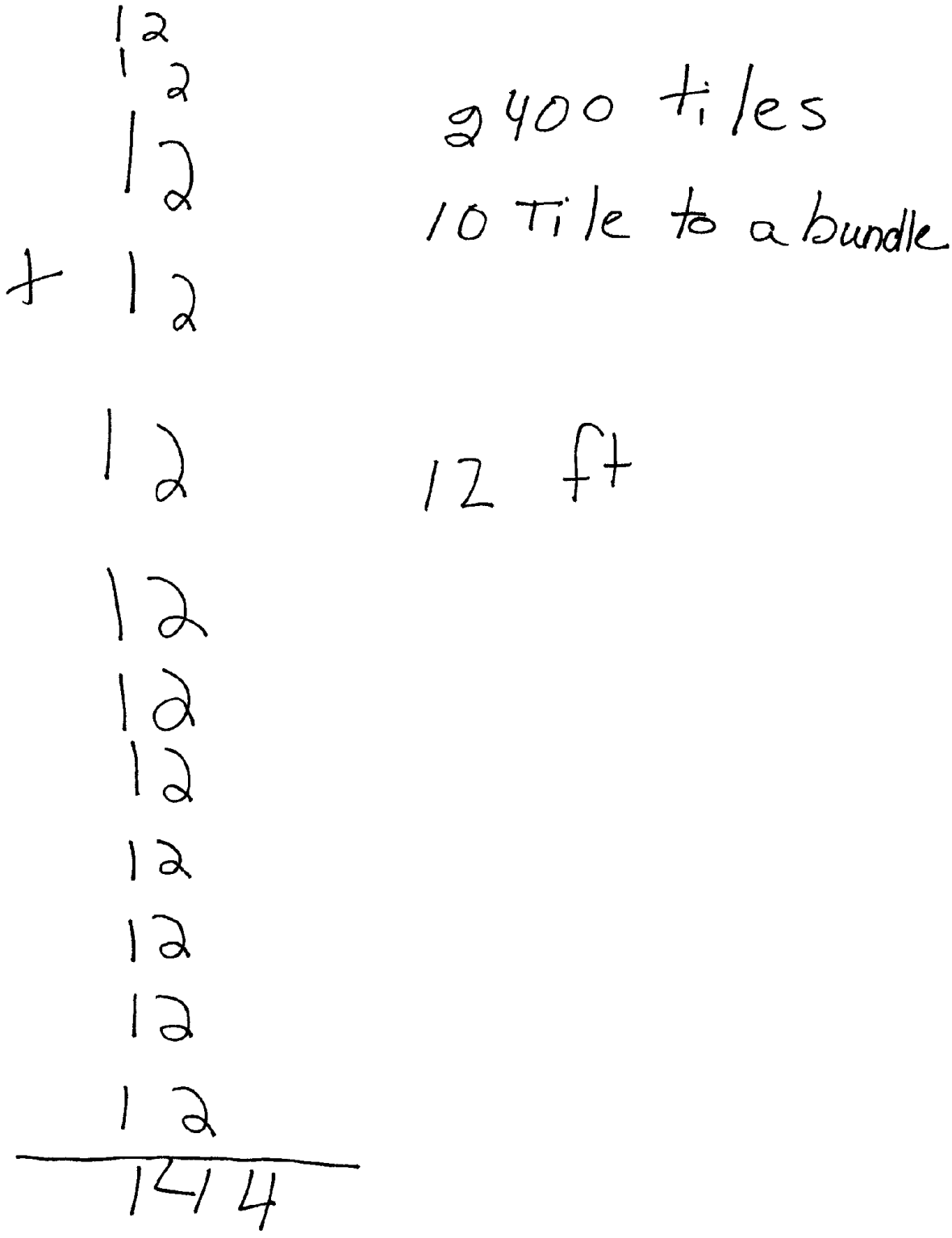
Apprentice



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Practitioner

2,400 tiles

240 bundles are needed

840 dollars are needed to pay the total expence.

The student addresses all three parts of the task and gets a correct solution.

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Practitioner

The student does not show work about how 240 was obtained.

Student explains how the cost was figured.

Dear Mrs. Mckegney,

How is your kitchen floor? While your floor is being tiled I'm working really hard in math class (I got an A+ on it.) This weird teacher made us do a problem about your kitchen floor. You will need 2,400 tiles to fit into your 10x15 feet floor. Since the tiles are sold in bundles of 10 you will need 240 bundles. With each bundle being 3 dollars and 50 cents you have to pay 840 dollars. I found this out by multapling 240 for the number of bundles by $3.50 which is the price per bundle. With this help I hope you can make your new kitchen floor easier, By the way do you have to move your fridge and stove? If you don't move them you won't need so many tiles, bundles and it won't cost so much. If your fridge is 3 fl. by 3 ft. you can fit 144 tiles in the fridge area. To do this I multipiled 12x12 and the equation was 144. I rounded 144 to 140 then divided 140 by 10 and it equaled 14 bundles. When you minus 14 bundles it lowers the cost.

This attempt to extend the solution was commendable, but incorrectly executed.

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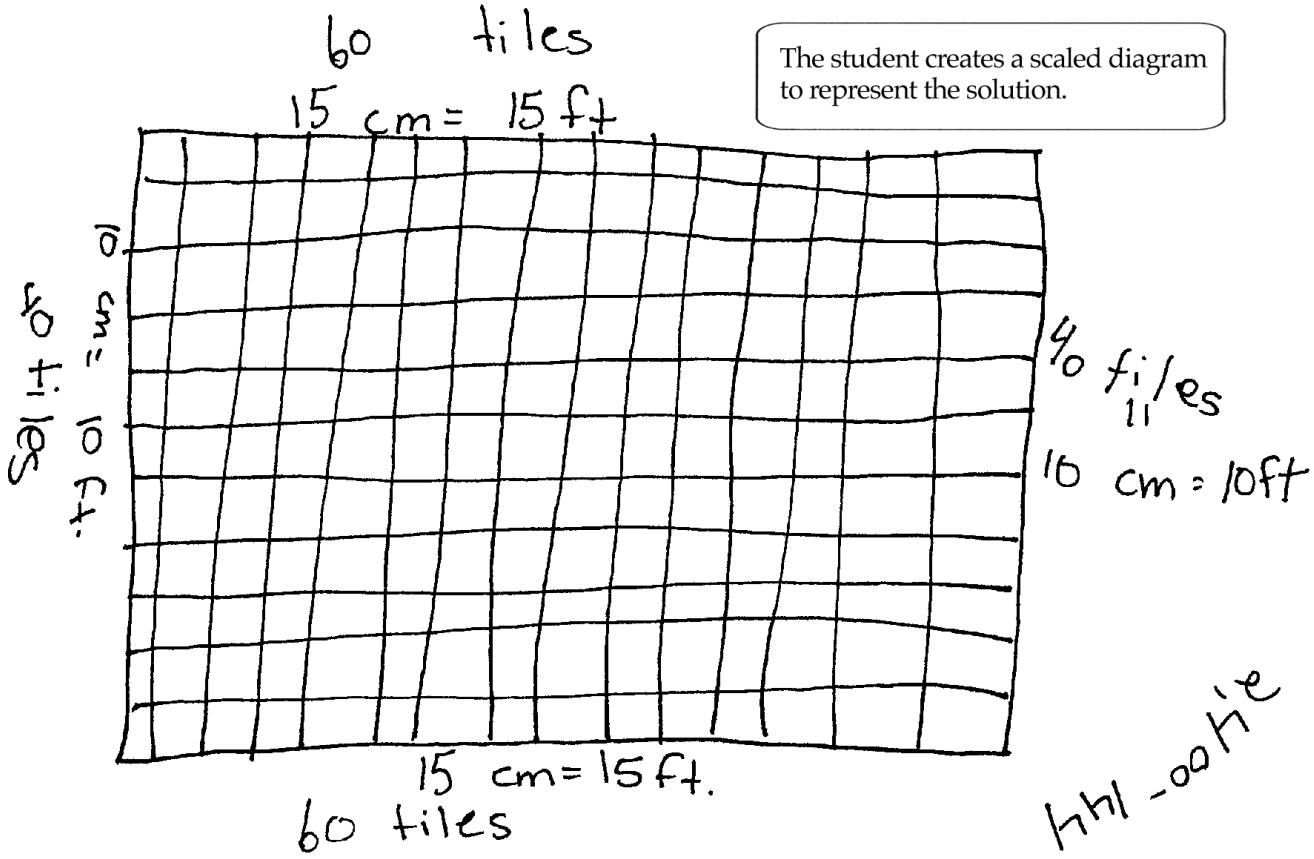
Practitioner



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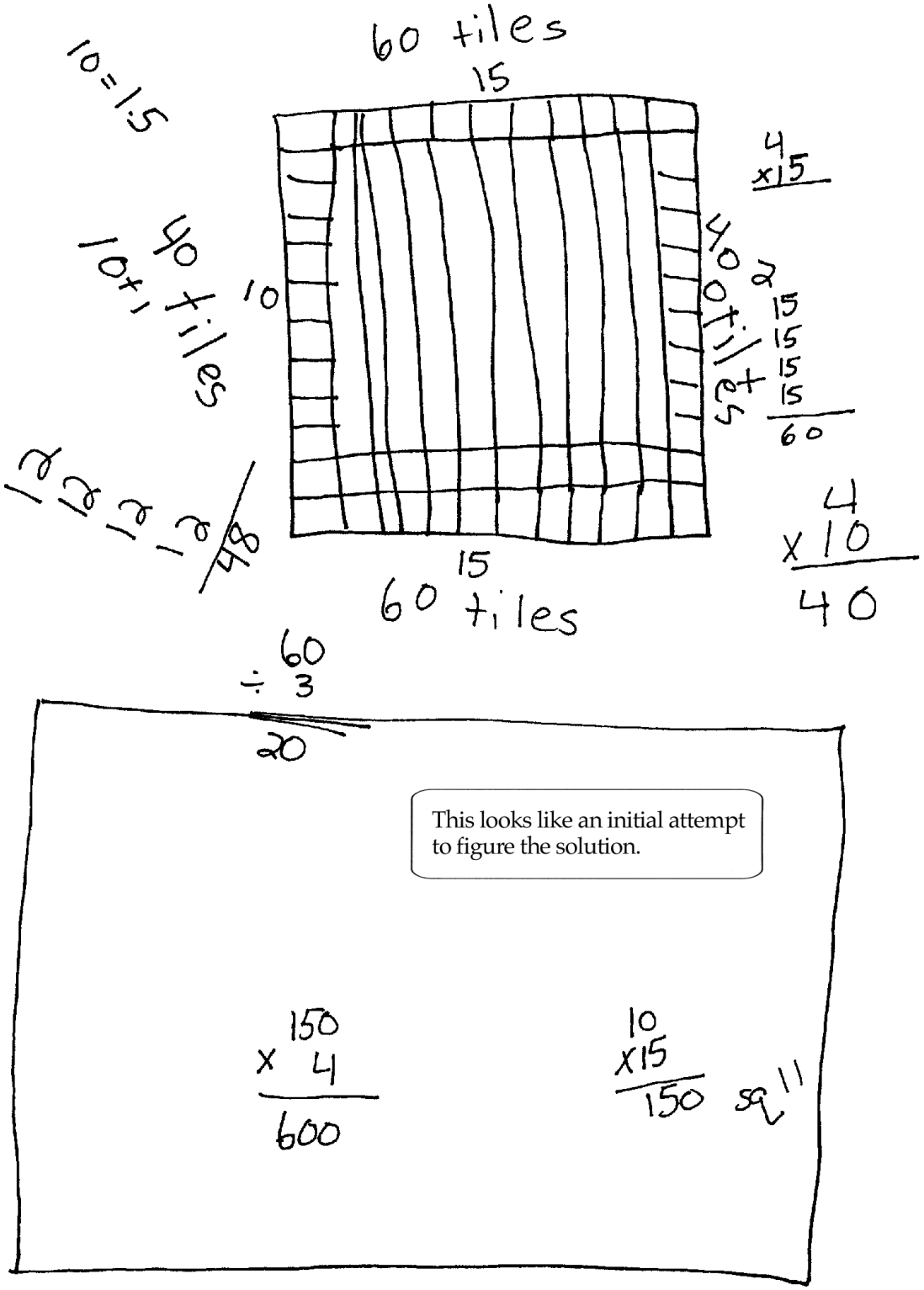
Practitioner



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Practitioner

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The student seems to add 60, 40 times to get the area.

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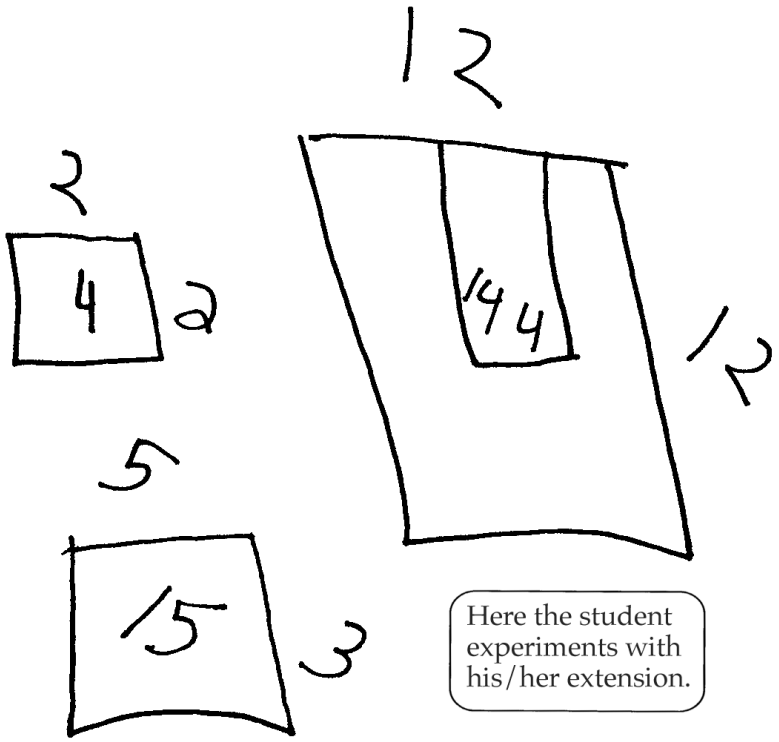
Practitioner



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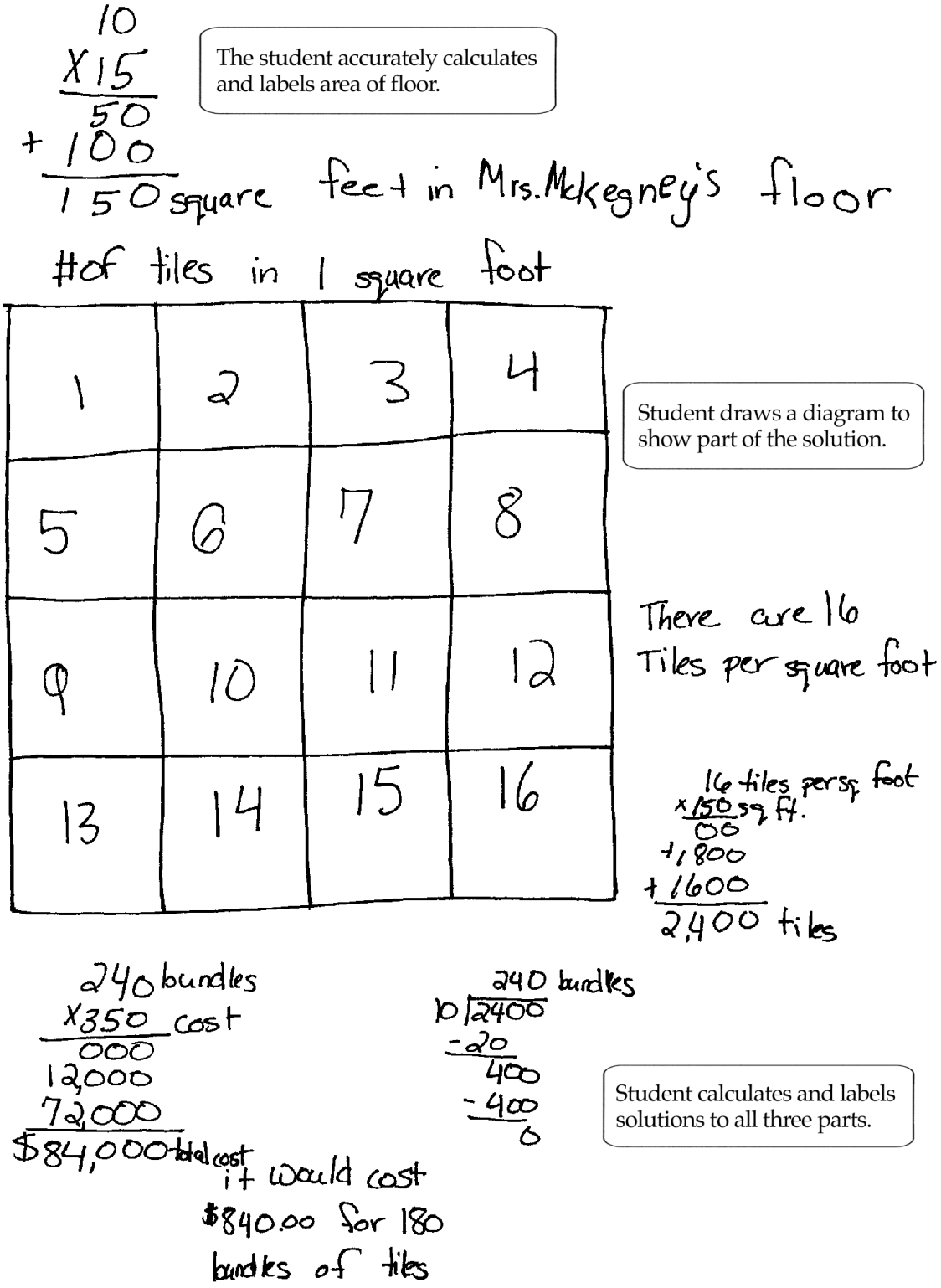
Expert



The student accurately calculates and labels area of floor.

Student draws a diagram to show part of the solution.

Student calculates and labels solutions to all three parts.

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Expert

Dear Mrs. McKegney,

I know that you have been having problems with filing your kitchen floor. I decided to help you out. First I figured out the amount of square feet in your kitchen floor. I multiplied the dimensions and come out with 150 sq ft. I then figured out how many tiles per sq ft. After that I 16 150 because there were 16 per ft^2 and 150 $ft.^2$ in all. I still had to figure out the # of bundles and cost. I divided the # of tiles in all by the number of tiks to a bundle. There were 240 bundles. I knew that bundles cost $3.50 each so I multiplied the number of bundles by the cost of each bundle. It would cost $840.00 for 2,400 tiles.

Student explains how the number of tiles, the number of bundles, and the cost were figured.

Uses appropriate and accurate math language to communicate solution.

Sincerely,

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