Mathematics: The Language of STEM
LET'S GET TO WORK!
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CONTENT AND TASK DECISIONS

Grade Level(s): 5th grade

Description of the Task: Given a complex shape and a task to find area, students will apply the formulas for the area of a rectangle, square and triangle. Once students find area, conversion will be used to determine square feet instead of yards. The final portion of the task includes multiplying decimals determining if they have enough money.

Indiana Mathematics Content Standards: 5.M.3 Develop and use formulas for the area of triangles, parallelograms, and trapezoids. Solve real world and other mathematical problems that involve perimeter and area of triangles, parallelograms, and trapezoids, using appropriate units for measure.

Indiana Mathematics Process Standards:

Mathematics Content Goals: Students will be able to apply formulas learned into a real world example and connect a variety of skills used in Mathematics.

Language Objectives: In small groups, students will communicate verbally as they learn to apply formulas learned to real world examples.

Materials: Students will need one copy of attached sheets (including reference page) per student and a pencil.

THE LESSON

Before: Prior to this activity, students should be able to multiply decimals, understand conversions, and have discovered area of a variety of shapes.
   ● **Activate prior knowledge:** Show students examples of complex shapes they may have seen in 4th grade with only rectangles or squares. Discuss how they found the area of that shape to bring in the idea of dividing complex shapes.
   ● **Be sure the problem is understood:** Once students have their packets, have them read the task independently and answer any questions about what their task is going to be that they may have. Give all students a few minutes of think time so that everyone has something to contribute.
   ● **Establish clear expectations:** During the "think time" all students should determine a good starting point and what information from the reference sheet will be useful at the beginning of the task. Once students begin working with their group, it is expected that all students share their thinking and listen to others.

During: Once all students have had about 5 minutes of think time, have students take turns explaining their strategies to the group.

- **Let go:** Students should be discussing strategies to break apart the shape in order to determine the area of each part. They should also be identifying formulas from the reference page needed for the first part of the task.
- **Listen actively:** As the teacher circulates the room, listen for understanding of area, shapes, and how formulas are applied. Also, check to see if students understand that after breaking apart and applying various formulas, they will also need to add the pieces back together to get the whole.
- **Support**: As the teacher acts as a facilitator circulating the room, questions that could be asked to students could include:
  - How can you justify your thinking?
  - What have you done in the past that might help you now?
  - What steps would help you solve the problem?

- **Extensions**: Once all three parts of the task are complete, challenge students to find the exact amount of money they would need to cover the shape. If the tile was on sale for 25% off what would be the total cost of the tile?

After:
- **Promote a mathematical community of learners:** Once all students have a solution for the first part of the task (finding area), have groups take turns presenting to the congress (math class) their strategies, struggles (everyone has them) and solution to the task.
- **Listen actively without evaluation:** The question could be asked: "What formulas did this group need to use from the reference sheet in order to arrive at their solution?"
  - How did you convince yourselves this was the best way to solve this problem?
  - What information did you need to find in order to solve?
  - Did you have any struggles as a team? If so, how did you solve those problems?
- **Make connections:** Discuss how this is a real world example of when finding area is relevant. Think of other times as a class/small group and share thinking. Also apply the other two questions of the task to real world experiences.
- **Summarize main ideas:** Discuss how finding the area would be nearly impossible without breaking the complex shape down into familiar parts. This applies to many math and real world problems. It is always much easier to conquer small steps than be overwhelmed by the big picture. Also this task is divided into three parts to make finding all the information seem manageable, whereas if it were all one question, it would feel much more challenging!

ASSESSMENT

Observe: As the facilitator/teacher is circulating the room, it should be apparent the understanding of area as well as multiplication of decimals, and conversions through meaningful conversations by students.

Ask: What information did you need to determine the area? How did solving the first part of the task help you in solving the second part…the third part? Are there different strategies you could have used that would have been more efficient? How could you use this task to help you in the future?

Technology: Students could create their own task using complex shapes on their computers/iPads and trade with other students to solve.

LET'S GET TO WORK...

You are on your way to success!!!! Below is the floor plan for your new business! The first thing you need to do with your new location is put tile on the floor. How many square feet of tile will you need to cover the floor of your new business?

21 feet

9 feet

9 feet

9 feet

9 feet

24 feet

18 feet
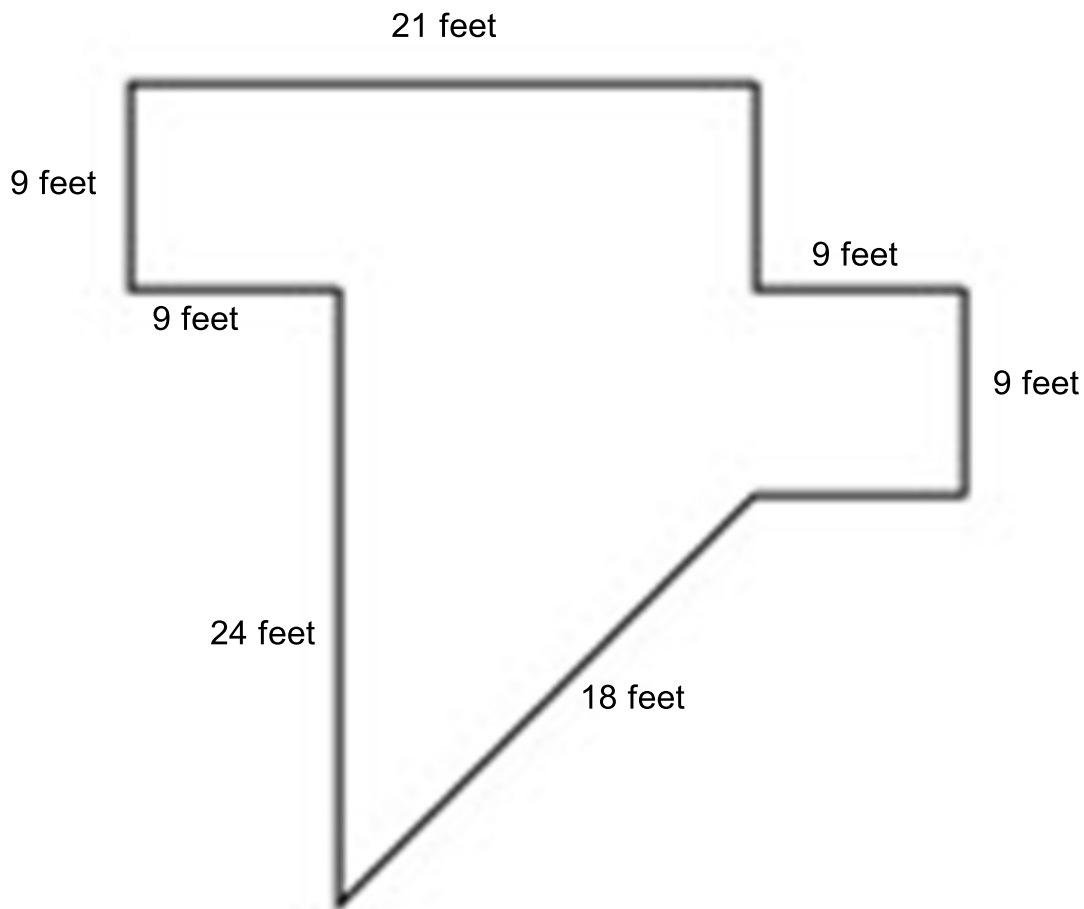
Answer:_____

Next Challenge for the new business owner...

You get to the store to buy the tiles and realize that tiles are sold in square YARDS...not square FEET!!! How many tiles will you need to purchase?

21 feet

9 feet

9 feet

9 feet

9 feet

24 feet

18 feet
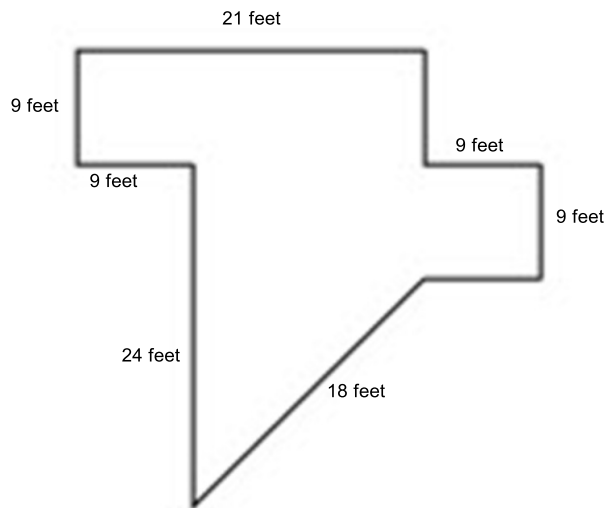
_____tiles

Finally, you get that figured out and now it is time to pay! When you get to the register, you have $675. If each tile costs $5.25 (including tax), do you have enough money? If so, how much do you have left? If not, how much more would you need?

COST:_____

Extra:_____

We need $_____more!

Reference Sheet

- Area of a square/rectangle $A = L \times W$
- Area of a triangle $A = (B \times H)/2$ OR $\frac{1}{2}(B \times H)$
- Area of a trapezoid $A = (B1+B2)/2 \times H$