**Perimeter and Area of Composite Shape**

Grade Level: 3

Subject: Math

Theme/Topic: Find the area of an outdoor deck, which is a composite shape, and calculate the amount of paint needed and how much the project will cost.

Student Outcomes:

* Students will practice finding the unknown side lengths of a composite shape, and perimeter of the shape.
* Students will find the total area of the composite shape by partitioning the shape in to separate rectangles, and adding the area of the rectangles together.
* Students will determine how much paint they will need for the painting project, and how much the project will cost.
* Students will work cooperatively in small groups following small group norms, and then share their strategies and results with the class.

Common Core State Standard:

*Measurement and Data C.7D*

Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems.

**Required Materials and Equipment:**

* Photo of deck
* Handout with drawing of composite shape and missing side lengths, including questions “how many gallons of paint are needed to paint the deck?” and “how much will this painting project cost?”. Other information included is how many square feet are covered by one gallon of paint, and the cost of a gallon of deck paint ($103 per gallon, each gallon of paint covers 100 square feet)
* Pencils
* Small student whiteboards, markers and erasers

**Agenda**:

1. Review strategies for finding the unknown side lengths of a composite shape.
2. Review strategies for decomposing a composite shape and finding the total area.

**Warm up**: “How do we find the area of a composite shape?”. “How do we find the length of an unknown side?”

**Anticipatory Set:**

Display photo of my deck. “My deck is very worn, and I need to repaint it this summer. How can I determine how much paint I will need to buy, and how much it will cost?” Brainstorm possible strategies.

**Guided Practice:**

* Review small group expectations: everyone participates-choose a reporter, recorder, facilitator and resource manager.
* In small groups, consider the problem on the handout. How can you find the length of the unknown sides? How can you decompose the composite shape to find the total area?
* Encourage students to make sense of their strategies by defending them to their groups.
* Ask students if they can find more than one way to decompose the deck shape?
* After students determine the painting project will require more than one gallon of paint (and there will be leftover paint), ask students how this information should be used to determine how many gallons I must purchase. Inform students, at this point in the lesson, that paint can only be sold by the gallon, and not partial gallon.
* If a group has completed the task, require them to determine how many gallons of paint (and how much money) would I need to paint both of my decks, if the second one is the same size as the first.

During this time, the teacher is available and walking around the room to assist and ask questions, guiding students to come up with their own strategies rather than telling them how to solve. The teacher is encouraging struggling students to draw a model of their idea, and is also making sure all members of each group are participating and active.

**Direct Instruction:**

* Allow each group to display their strategy to the class, and explain their methods and results.
* Encourage class to ask clarifying questions during each group’s explanation.
* Discuss ***why*** I must purchase two gallons of paint for 157 square feet. Do I purchase more than the amount, or less than the amount and why?
* Facilitate a growth mindset climate by encouraging students to share their mistakes, and ask if they can tell why they got the wrong answer.
* Ask students if they can think of a harder question to solve, using my deck’s square footage and the given quantity and cost of the paint.

**Closure**: Go over the list of the group’s strategies that were discussed and talk about the pros and cons for each one.

**Independent Practice**: Allow each student to try to determine how much paint I would need and the total cost if I had to paint two coats. Have them show their work on small whiteboards, encouraging students to determine a strategy and make sense of their solution.

**Assessment and Follow-Up:** Check the student’s work for accuracy and completion. Have them write on their whiteboards what they found challenging, and one thing they learned in the lesson.