

## *Mathematics: The Language of STEM*

### Shark Attack! Krista Atkins

#### CONTENT AND TASK DECISIONS

**Grade Level(s):** 3rd

**Description of the Task:** Warsaw just announced some exciting news! A shark aquarium will be built and YOU will be the lead designer of the team. The city has given you a 100 square feet area to use for the different aquariums you will need for the different species of sharks. As the lead designer of this project, you are in charge of building the floor plans for the aquariums and choosing which shark species will inhabit the aquarium. Remember, the people of Warsaw will want to see a variety of sharks.

**Indiana Mathematics Content Standards:** 3.M.5: Find the area of a rectangle with whole-number side lengths by modeling with unit squares, and show that the area is the same as would be found by multiplying the side lengths.

**Indiana Mathematics Process Standards:** PS.2: Reason abstractly and quantitatively

**Mathematics Content Goals:** Using area, cover a 100 square feet area with different species of sharks.

**Language Objectives:** With a partner, students will design a 100 square feet area aquarium for Warsaw, Indiana using graph paper.

#### **Materials:**

##### **Students:**

10X10 graphing paper (so it is 100 square feet)

Pencils

Crayons or markers

Paper large enough to display the tank and other information

##### **Teacher:**

PowerPoint (schema)

#### THE LESSON

##### **Before:**

- **Activate prior knowledge:** Let's talk about area! What do you know about area? Turn and talk with your neighbor about what you know. What do we know about sharks? Would each species need the same amount of space to live?
  - **Sentence frames:** To find area you would \_\_\_\_\_.  
I would use area because \_\_\_\_\_.
- **Be sure the problem is understood:**

The city has given you an area measuring 100 square feet for your shark aquarium. As the lead designer of this project, you are in charge of designing the area for these aquariums and choosing what shark species will inhabit the aquarium. You will not need to factor in space between the aquariums. There will be glass separating the different species. Remember, the people of Warsaw will want to see a variety of sharks.

After researching what each shark needs, here is what you have discovered: (show PowerPoint)

Great White Shark (gray) – has a floor plan of 48 square feet

Hammerhead Shark (black) – has a floor plan of 40 square feet

Lemon Shark (yellow) – has a floor plan of 32 square feet

Mako Shark (blue) – has a floor plan of 20 square feet

Spiny Dogfish Shark (purple) – has a floor plan of 10 square feet

Lollipop Catshark (orange) – has a floor plan of 8 square feet

Use this information and color code to model what the aquarium will look like on the graph paper.

- **Establish clear expectations:**
  1. Work together to decide what shark species use in the tank (the more variety the better).
  2. Try to get as close to 100 square feet area as you can.
  3. Record each shark and color the squares based on the shark species color (see above) on the graph paper.

#### **During:**

- **Let go:** Students will start putting the shark aquariums by planning with a pencil then coloring the graph boxes. Students will need to use the key to represent the different species of sharks and also keep track of how much space has been used. They will need to start at 100 and subtract each shark until they can't add any more aquariums in the 100 square feet. After the pencil graph is complete, the group can begin to color the squares to match the key. Then they will make a poster with the different species stating how much area was used per type of shark.
- **Listen actively:** As the students work, the teacher will listen for the partners to discuss the different amount of space each shark will need. Listen for them to talk about getting as many different species in the provided space as they can.
- **Provide appropriate support:**

How did you decide which sharks you would have at the building?  
How many different sharks do you have in your building?  
How did you get to 100 sq ft of shark tanks?  
What have you done so far?  
Which species could you have the least/most of in your plan?
- **Provide worthwhile extensions:**

If you use only lollipop cat sharks, how many sharks could you fit in a 120 square feet area?  
How do you know?  
If you use only \_\_\_\_\_ sharks, how many sharks, of that species, could you fit in 120 square feet space? How much space is left?

## After

- **Promote a mathematical community of learners**  
Partners will share their aquarium area in math congress. They will share the amount of space they have left and the process (subtraction, strategies, struggles, and solutions) they used to cover the space in their building.
- **Listen actively without evaluation**  
How did you work together to decide which species of sharks to put in your space?  
What was the most challenging part of covering the space?  
How did you use teamwork to complete the project?
- **Make connections**  
What prior knowledge helped you keep track of the square feet?  
What tools or strategies did you use to keep track of the square feet?  
How did multiplication help figure out the square feet used for each species?  
Where else in the “real” world would you need to know area? Give examples.
- **Summarize main ideas**  
Today you worked to build aquariums using length x width to cover the area using different shark species.

## ASSESSMENT

### Observe:

- Look for evidence that students see the connections between multiplying length x width to find area.
- Look at the graphing paper for errors when finding the area.

### Ask:

- How does multiplication relate to finding the area?