

Surfin' and Searchin'

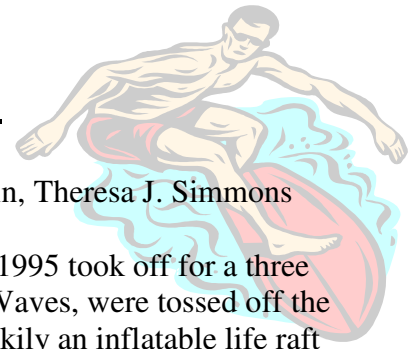


Table #4: Cathy Williams, Jim Greene, Susan Antonsen, Demian Morquin, Theresa J. Simmons

It was a dark and stormy night when the Euclid High School Class of 1995 took off for a three hour reunion cruise. Unfortunately, two alumni, Seymour Boats and Manny Waves, were tossed off the boat when it hit a large wave. None of their former classmates noticed but luckily an inflatable life raft fell off with Seymour and Manny which they were able to use to arrive at an isolated island.



The island was covered with thick vegetation, including lots of raspberry bushes. The beaches were all very rocky. Manny liked to surf and quickly improvised a surfboard. He decided he would be happy to spend the rest of his life surfing the beaches of the island. Seymour was desperate to return home and decided he would spend his days searching for a rescue boat.

They also concluded that the island was in the shape of an equilateral triangle. They each needed to build a shelter since there were very stormy nights.

Seymour would have to locate his shelter and then clear a path through the thick vegetation from his shelter to each of the corners of the island; Seymour wants to search for ships from a different corner of the island each day. Manny would build his shelter and then clear paths from his shelter to each of the beaches; he wants to surf on a different beach each day. Remember, both want to minimize the amount of path clearing they will need to do!!

1. Help Seymour plan the best location for his shelter. Remember that the shelter can't be located on the beach because of the high tide. What is the total length of the paths he would have to clear in terms of the island side length, s . Have someone in the group verify another member's measurements and calculations.
2. Help Manny plan the best location for his shelter. What is the total length of the paths he would have to clear in terms of the island side length, s . Have someone in the group verify another member's measurements and calculations.
3. How are the results of problem #2 different from the results of problem #1?

Extension

4. What if Seymour and Manny had landed on triangular islands that are not equilateral? You might start your investigation by creating a scale drawing of an isosceles triangular island with two sides of length 20 km and the third side longer than 20 km or shorter than 20 km.

Level: Most appropriate for a high school geometry class but could be used as an informal exploratory activity in earlier grades.

Purpose:

- To explore characteristics and properties of points of concurrency in triangles (in anticipation of lessons on this topic)
- To use algebra to justify geometry solutions
- To apply knowledge of 30-60-90 triangles
- To discover that similar problems can yield quite different solutions

Concepts for further development:

- Proof that Manny's location doesn't matter
- Algebraic generalizations of total distances
- Argument that vertices are best "lookout points"

Anticipated Student Approaches:

- Make pencil-and-paper sketches and apply algebra
- Make scale drawings on graph paper and apply a guess-and-check strategy
- Fold paper triangles in search of some type of "center"
- Use Geometer's Sketchpad and its measurement tools to explore minimum total distance

Where Should Manny Build His Shelter?

Move his shelter to determine the location that minimizes the total amount of path he has to clear.

$$(\text{Distance Manny's Shelter to } \overline{AD}) + (\text{Distance Manny's Shelter to } \overline{BA}) + (\text{Distance Manny's Shelter to } \overline{DB}) = 17.4 \text{ cm}$$

