



G-TEAMS at Tucson High School: Michael Bishop and Lisette Eckman

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G-TEAMS fellows bring their mathematical expertise into K-12 classrooms in a year-long partnership with local mathematics teachers. The goals of the program include: (i) introducing mathematical thinking to K-12 students; (ii) enriching curriculum possibilities for K-12 teachers; (iii) strengthening fellows' ability to communicate mathematical ideas to non-mathematician audiences; and (iv) introducing mathematical modeling techniques to K-12 students in order to enhance their appreciation for the role of mathematics in other disciplines.

CSI Lesson

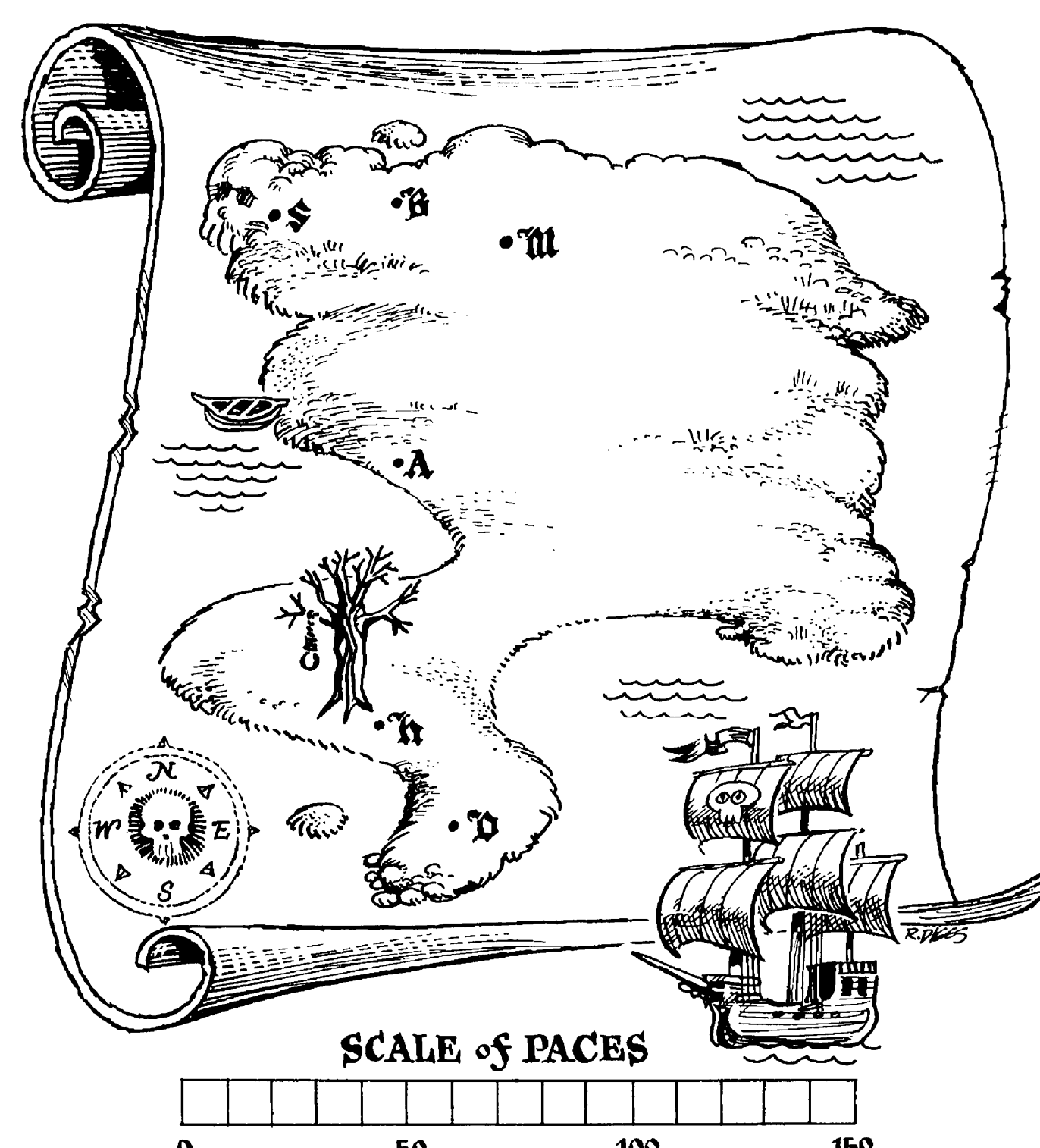
Who doesn't love a good mystery? In this case, the murderer was caught, and the local CSI unit needed to locate all of the bodies. The "Crazy Cartographer" left clues to the bodies. Since the loon was completely against technology, paper and pencil methods have to be used to discover the locations on a map.

We decided that this might be an interesting way to introduce compass and straight edge constructions. Using Google Maps, we took an area of desert, west of the Tucson Mountains, with a few roads on it for markers. We then created definition in the roads, and added point names to the map in order to make the instructions eas



The instructions consisted of various types of compass and straight edge constructions. At first, we let the students stumble around and try to figure out how to do them, instead of just telling them. Several students were able to discover on their own how to copy lengths, etc. We then worked through a few of the constructions, which enabled some students to figure out more on their own.

For the test, we used the following map and have the students navigate to find pirate treasure to finish the lesson on constructions focused on cartography.



Introducing the Team

"I applied for the G-Teams program because I thought it would be a good way to get some more real-world math applications for my students."

Lisette Eckman,
Geometry and College Algebra
Teacher, Tucson High Magnet
School



Michael Bishop,
PhD Student in Mathematics,
University of Arizona

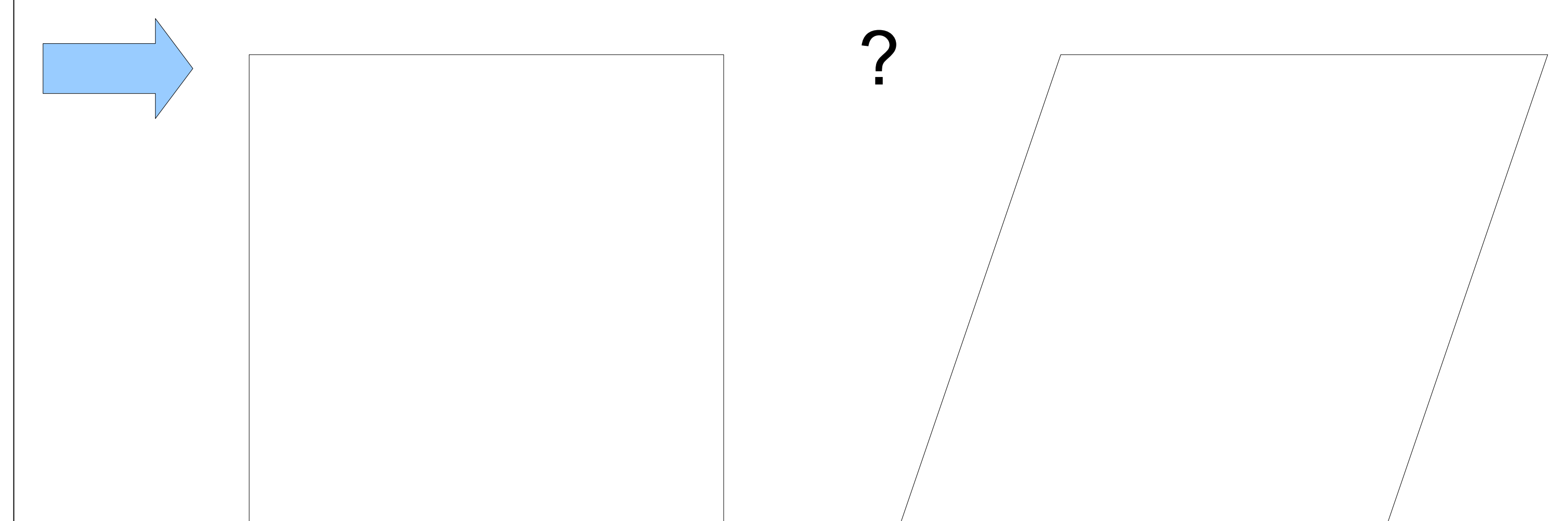
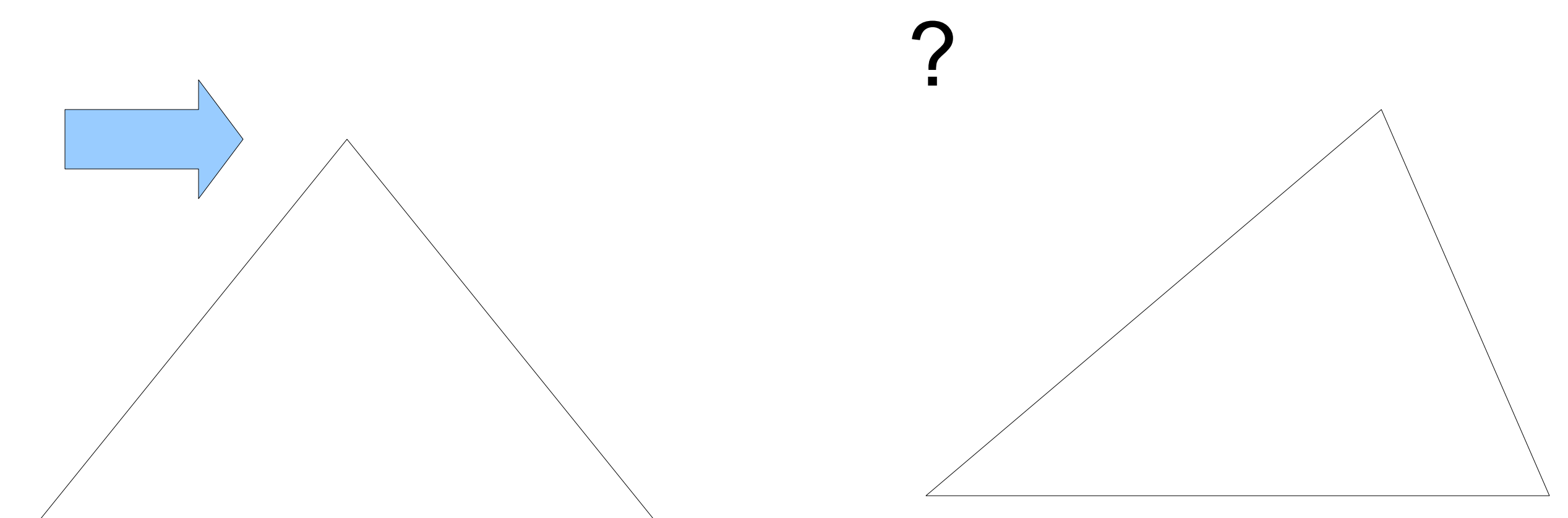
"Teaching is an opportunity to share our passion and expertise in mathematics. Sharing our struggles and our joys in understanding mathematics is a privilege for both us and our students."

Business Plan

The goal of this lesson is to learn functions through the practical application of a business or fundraising plan. The purpose is to understand inputs, outputs, domains, and ranges not merely as collections of numbers, but as practical values like price, profit, quantity demanded, and more. The exercise works on fundamentals of functions: Domain and Range, adding and multiplying functions, composition of functions, graphing, and finding maximums. The hope is that students will recognize the relationship between the mathematics and the application.

Strength of Shapes

This lesson is a combination of tactile learning coupled with deep-thinking. The students construct shapes out of straws and investigate their structural strengths. After building the shapes, they tape one of the straws to their desk and poke and prod the shape to see how it deforms. After some manipulation, they should recognize that the joints are weak and that smaller and simpler shapes are strong. Because the joints are weak, shapes that are not uniquely determined by their side lengths are easily deformed to another shape.



One of the main goals is to explain why triangles are naturally strong and appear in all sorts of engineering. This activity also motivates the importance of triangles in various day-to-day applications. Moreover, students develop intuition for how to build strong shapes from seemingly weaker shapes. For students working in carpentry and metal-working courses, this provides a mathematical support for why they use trusses and triangles.