PROBLEM 3: MARINE BIOLOGY

Hyperbolas can be used to locate objects underwater. To locate a whale in the ocean, two microphones are places 8000 feet apart. One microphone picks up a whale noise 0.4 seconds after the other microphone picks up the same noise. The speed of sound in water is about 5000 feet per second.

A. How much farther in feet from the whale is the other microphone?

B. Find an equation for the possible locations of the whale.

C. What is the closest distance that the whale could be to the other microphone?

D. Will the whale always be closer to the microphone that receives the signal first? Can the whale be on either branch of the hyperbola? Explain your reasoning.

REFERENCE: *Advanced Algebra,* Holt, Rinehart and Winston, 1997.

PROBLEM 4: MOUNTAIN TUNNEL

A semi-elliptical arch over a tunnel for a road through a mountain has a base at the opening of 100 feet. The height at the center of the tunnel is 30 feet. Determine the height of the arch 5 feet from the outside edge of the tunnel.

REFERENCE: *Precalculus, Third Edition,* by Larson and Hostetler, D.C. Heath and Company, 1993.