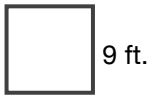
Fixed Perimeter, Changing Area

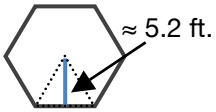
Extend Your Learning

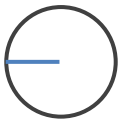
1. After observing how well the underground fence works, Al's neighbor, Rod, decides to put in an underground dog fence for his dog. Rod buys a kit containing 500 feet of wire. He also wants his fence to be in the shape of a rectangle and enclose the maximum area. The only difference is that Rod wants to use the backside of his house as part of the perimeter. Rod's house is 60 feet wide.
   a. What dimensions should Rod use to construct his fence? What will be the area of the enclosed region?

   b. How do you know that you have determined the largest possible area?

2. Zaid wants to purchase a trampoline. He is comparing a square trampoline, a hexagonal trampoline, and a round trampoline. All of the trampolines have a perimeter of 36 feet. The jumping area of each trampoline is shown below.







   a. Predict which trampoline has the largest jumping area.

   b. Determine the jumping area of each trampoline. (Hint: The formula for area of a triangle is $A = \frac{1}{2}bh$ and the formula for area of a circle is $A = \pi r^2$.) Was your prediction correct?

3. What shape do you think has the largest area for a fixed perimeter? Explain your reasoning.