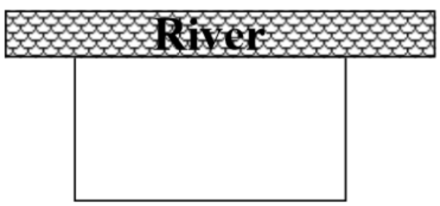
Keeper 5.5 Virtual Problems

1.) A ball is thrown straight up in the air from ground level. Its height after t seconds is given by $s(t) = -16t^2 + 50t$. When does the ball reach is maximum height? What is its maximum height?

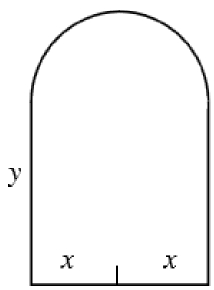
2.) A farmer has 2,000 feet of fencing to enclose a pasture area. The field will be in the shape of a rectangle and will be placed against a river where there is no fencing needed. What is the largest area field that can be created and what are its dimensions?



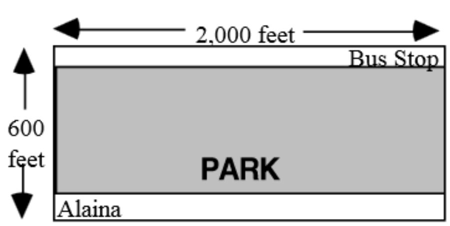
3.) A fisheries biologist is stocking fish in a lake. She knows that when there are n fish per unit of water, the average weight of each fish will be $W(n) = 500 - 2n$, measured in grams. What is the value of n that will maximize the total fish weight after one season.
(Hint: *Total weight = number of fish · average weight of fish*).

4.) The size of a population of bacteria introduced to a food grows according to the formula $P(t) = \dfrac{6000t}{60+t^2}$ where t is measured in weeks. Determine when the bacteria will reach its maximum size. What is the maximum size of the population?

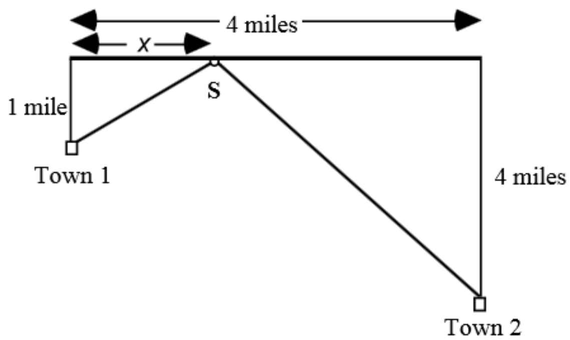
5.) A designer of custom windows wishes to build a Norman Window with a total outside perimeter of 60 feet. How should the window be designed to maximize the area of the window? A Norman Window contains a rectangle bordered above by a semicircle.



6.) Alaina wants to get to the bus stop as quickly as possible. The bus stop is across a grassy park, 2,000 feet east and 600 feet north of her starting position. Alaina can walk along the edge of the park on the sidewalk at a rate of 6 feet/sec. She can also travel through the grass in the park, but only at a rate of 4 feet/sec (dogs are walked there, so she must move with care or get a surprise on her shoes). What path will get her to the bus stop the fastest?



7.) On the same side of a straight river are two towns, and the townspeople want to build a pumping station, **S**, that supplies water to them. The pumping station is to be at the river's edge with pipes extending straight to the two towns. The distances are shown in the figure below. Where should the pumping station be located to minimize the total length of pipe?



8.) Below is the graph of $y = 1 - x^2$. Find the point on this curve which is closest to the origin.