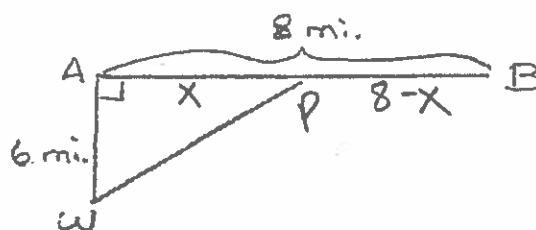


Calculus Group Work - Optimization

1. I don't know about you, but I wish that soda cans were bigger than 12 ounces. I'm thinking we need coke cans of 30 ounces (or about 887 cm^3). However, you have been put in charge of designing this can without using too much material. What should the radius and height of the can be in order to minimize the amount of material used? Draw a picture of this shape...do you think this would go over with the marketing department?
2. A tank with a rectangular base and rectangular sides is open at the top. It is to be constructed so that its width is 4 meters and its volume is 36 cubic meters. If building the tank costs \$10/sq. m. for the base and \$5/sq. m. for the sides, what is the cost of the least expensive tank, and what are its dimensions?
3. A cylindrical metal container, open at the top, is to have a capacity of 24π cubic cm. The cost of material used for the bottom of the container is \$0.15/square. cm., and the cost of the material used for the curved part is \$0.05/square cm. Find the dimensions that will minimize the cost of the material, and find the minimum cost.

4. An offshore well is located in the ocean at a point W which is six miles from the closest shore point A on a straight shoreline. The oil is to be piped to a shore point B that is eight miles from A by piping it on a straight line under water from W to some shore point P between A and B and then on to B via a pipe along the shoreline. If the cost of laying pipe is \$100,000 per mile under water and \$75,000 per mile over land, how far from A should the point P be located to minimize the cost of laying the pipe? What will the cost be?



5. A person in a rowboat two miles from the nearest point on a straight shoreline wishes to reach a house six miles farther down the shore. If the person can row at a rate of 3 mi/h and walk at a rate of 5 mi/h, find the least amount of time required to reach the house. How far from the house should the person land the rowboat?

