

Problem 1. A rectangle has circumference 12m. What is its largest possible area?

Problem 2. A rectangular-shaped garden is built next to a long wall, and the garden needs to be enclosed by a fence. If the area of the garden is 20m^2 and we want the total length of the fence as small as possible, what are the side lengths of the garden?

Problem 3. A rectangular box without top has volume 4m^3 and its bottom is a square. What is its smallest possible surface area?

Problem 4. Which point(s) on the parabola $y = x^2$ is closest to the point $(0, 4)$?

Problem 5. A dog is standing next to a river of width 40m and tries to get to a point across the river. The distance between the dog and the point is 50m. If the dog can run at a speed of 4m/s and swim at a speed of 2m/s, what is the shortest possible time the dog needs to get to the point?