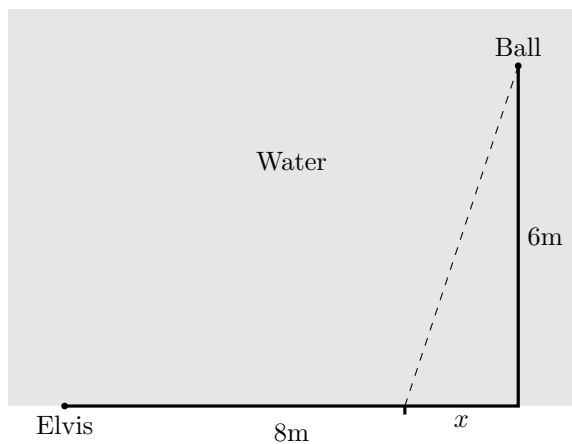1. Find two positive numbers x and y such that $y + x = 54$ and $x^2 y$ is as large as possible.

2. A dog named Elvis is on the edge of a lake and his ball is in the water 8 meters down the shore and 6 meters into the water. The diagram shows the view from above. Elvis can run along the beach at a speed of 3 m/s and he can swim at 1 m/s. Elvis wants to get to the ball as quickly as possible.

a) How long does it take Elvis to get to the ball if he swims all the way?

b) How long does it take Elvis to get to the ball if he swims as little as possible?

c) Find and equation for the time it takes Elvis to get to the ball if he runs down the beach to a distance x from the point on the shore closest to the ball and then swims. Use this equation to find the shortest possible route to the ball.