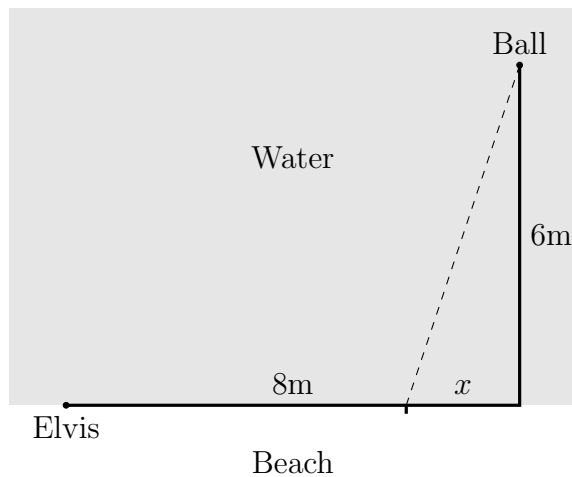


## OPTIMIZATION

1. 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.



- How long does it take Elvis to get to the ball if he swims all the way?
- How long does it take Elvis to get to the ball if he swims as little as possible?
- Find an 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 fastest possible route to the ball.

**2.** In an effort to minimize the cost of production, the makers of Slurm soda want to reduce the amount of aluminum used to make their soda cans. The cans must meet the following conditions:

1. they should be cylinders (with a top and bottom);
2. they must have a volume of 360 ml;
3. the top and the bottom of the can are made from a material twice as thick as the material of the side.

Find the dimensions that minimize the amount of aluminum per can.