

## Water hose

A stream of water exits from the nozzle of a hose with a constant unknown speed  $v$ . A child plays with the hose by rotating it randomly in a fixed vertical  $x - y$  plane. The nozzle is kept at  $x = y = 0 \text{ m}$ , and the angle between the nozzle's axis and the horizon is never less than  $45^\circ$ . At each moment in time, the stream in the air has an irregular shape. The shape at one instant is shown in the figure below.

Using this figure, determine the exit speed  $v$  if the free fall acceleration is  $g = 9.8 \text{ m/s}^2$ .

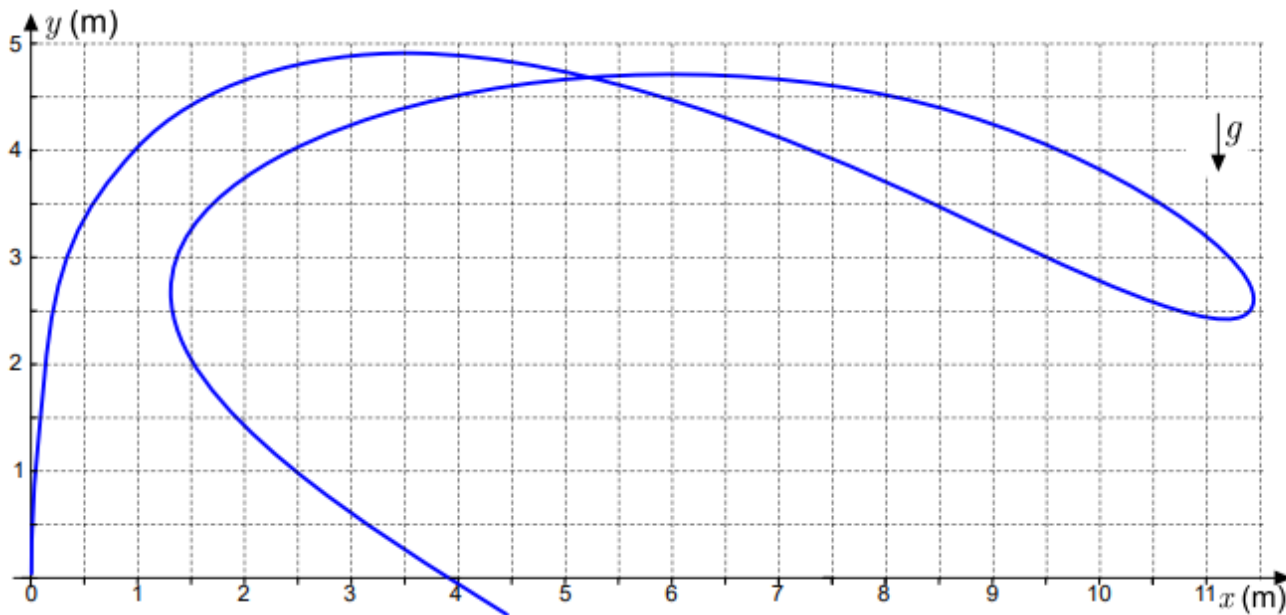


Figura 1: Shape of the water stream at a certain moment in time (larger version provided on separate sheet).