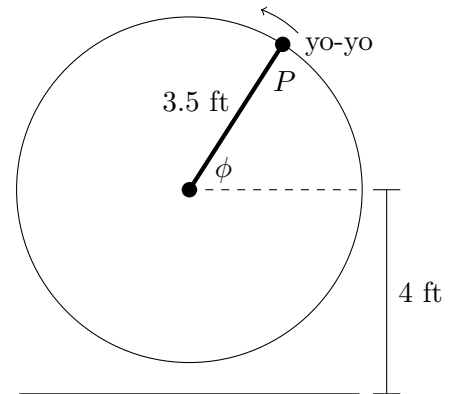


7. [7 points]

Amira's friend Paul borrows her yo-yo and starts spinning it in a counterclockwise circle at a constant speed. His hand holds the string, at the center of the circle shown, 4 feet off the ground. The length of the string between his hand and the yo-yo is 3.5 feet.

In this problem, measure angles counterclockwise from the positive horizontal as usual. When the yo-yo is at point P , the angle ϕ as shown in the diagram to the right is $\frac{3\pi}{8}$ radians.



- a. [3 points] How high off the ground is the yo-yo when it is at point P ? *Give your answer in exact form or rounded to at least two decimals.*

Height: _____ feet

- b. [2 points] After the yo-yo travels most of the way around the circle from its current position, there will be a moment at which it is directly underneath point P . Find the angle, in radians, between 0 and 2π , at which this occurs. *Give your answer in exact form or rounded to at least two decimals.*

Angle: _____ radians

- c. [2 points] It takes the yo-yo 1 second to make a complete circle. What angle, in radians, will the yo-yo make with the positive horizontal $1/3$ of a second after it is at point P ? *Give your answer in exact form or rounded to at least two decimals.*

Angle: _____ radians