

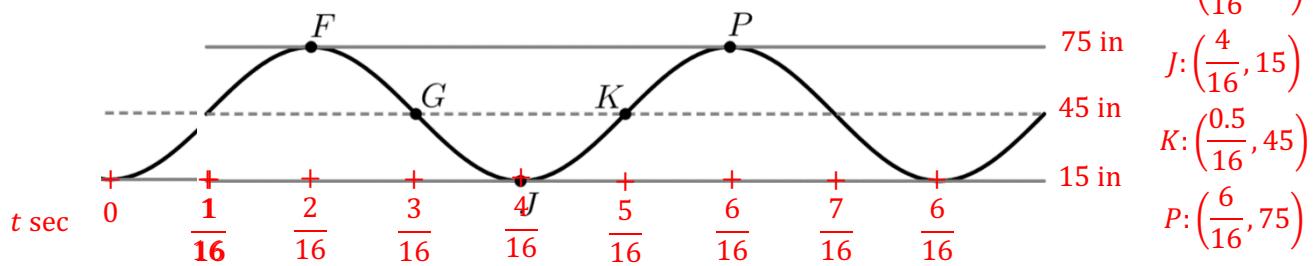
Note: Figure NOT drawn to scale

1. A prize wheel used for a game show has an electronic motor that allows a circular wheel to spin at a constant speed in the clockwise direction until a contestant presses the stop button (not shown). The center of the wheel is 30 inches away from point A. At time $t = 0$ seconds, point A is at the lowest spot on the wheel, and the distance between point A and a level table is 15 inches, as shown in the figure. The wheel completes 4 full rotations every second. As the wheel spins, the distance between point A and the level table periodically increases and decreases.

The periodic function d models the distance, in inches, between point A and the level table as a function of time t in seconds.

- (A) The graph of d and its dashed midline for two full cycles is shown. Five points, F, G, J, K , and P are labeled on the graph. No scale is indicated, and no axes are presented.

Determine possible coordinates $(t, d(t))$ for the five points: F, G, J, K , and P .



At time $t = 0$ seconds, point A is at the lowest spot on the wheel and 15 inches from the table, so one rotation later, at $t = 0.25$, the distance between point A and the table is 15 inches.

- (B) Refer to the graph of d in part (A). The t -coordinate of J is t_1 , and the t -coordinate of K is t_2 .

- (j) On the interval (t_1, t_2) , which of the following is true about d ?

- d is positive and increasing.
- d is positive and decreasing.
- d is negative and increasing.
- d is negative and decreasing.

- (ii) On the interval (t_1, t_2) . Describe the concavity of the graph of d and determine whether the rate of change of d is increasing or decreasing.

The rate of change of d is increasing because the graph of d is concave up on the interval (t_1, t_2)