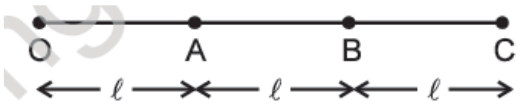
Answer on Question #55907-Physics-Classical Mechanics

Three identical particles are joined together by a thread as shown in the figure. All the three particles are moving on a smooth surface horizontal plane about point O. If the speed of the outermost particle is V, then the ratio of tensions in the three sections of the string is: (Assume that the string remains straight)



(1)3:5:7

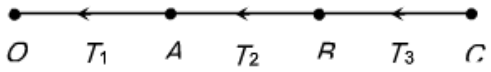
(2)3:4:7

(3)7:11:6

(4)3:5:6

(Hint: the distance between each point is l)

Solution



Let the angular speed of the thread is ω.

For particle C

$$T_3 = m\omega^2 3l.$$

For particle B

$$T_2 - T_3 = m\omega^2 2l \rightarrow T_2 = m\omega^2 5l.$$

For particle A

$$T_1 - T_2 = m\omega^2 l \rightarrow T_1 = m\omega^2 6l.$$

Answer: (4) 3:5:6.