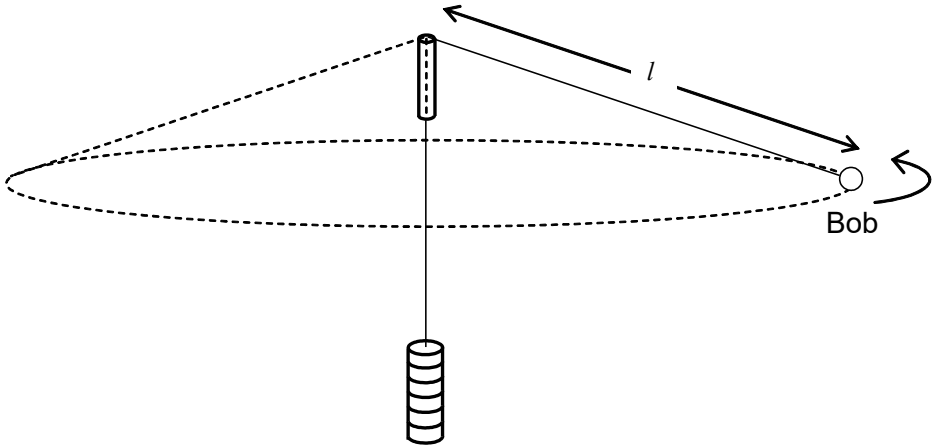
15 A bob is tied using an inelastic string to a fixed set of brass weights. It is then made to execute circular motion in a horizontal plane, so that the string traces out a cone, as shown in the diagram below. The string is passed through a smooth vertical glass tube so that the length *l* of the string from the top of the glass tube to the bob can vary freely as the speed of the circular oscillation changes. What is the relationship between length *l* and the frequency *f* of the circular motion?




A $l \propto f^2$

B $l \propto f$

C $l \propto \frac{1}{f}$

D $l \propto \frac{1}{f^2}$