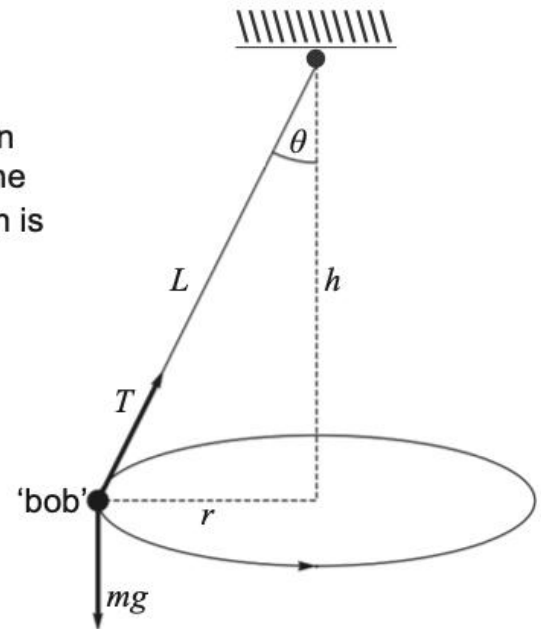


Question 17**(16 marks)**

The diagram to the right shows the two forces acting on a conical pendulum as it spins at a set frequency. The vector addition of these two forces provides the centripetal force on the 'bob'. The mass of the 'bob' is 255 g and the length of the pendulum string L is 1.20 m. When the frequency of rotation is 0.490 Hz, the angle $\theta = 30.0^\circ$.



- (a) Calculate the tension in the string when $\theta = 30.0^\circ$.

(4 marks)

Answer: _____ N

- (b) Calculate the radius of the circular path the 'bob' is moving in when the angle is 30.0° .

(2 marks)

Answer: _____ m

- (c) Calculate the new angle between the pendulum string and the vertical if the frequency of rotation is doubled. (6 marks)

Answer: _____ °

- (d) Explain why θ can never equal 90.0° , regardless of how great the frequency of the pendulum becomes. You may use mathematical relationships in your answer. (4 marks)
