Answer on Question #73074-Physics-Other

A marble is kept on a rough horizontal rotating table which is rotating at the speed of two revolutions per minute. The coefficient between the table and the marble is 0.6. Find the minimum radius of the table to keep the marble in a steady circular motion

Solution

For the equilibrium in the horizontal direction:

$$F_{fr} = m\omega^2 R.$$

For the equilibrium in the vertical direction:

$$N = mg$$
.

We have:

$$F_{fr} = \mu N.$$

So,

$$F_{fr} = \mu mg = m\omega^2 R$$
$$R = \frac{\mu g}{\omega^2} = \frac{(0.6)(9.8)}{\left(\frac{4\pi}{60}\right)^2} = 134 \, m.$$

Answer: 134 m.

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