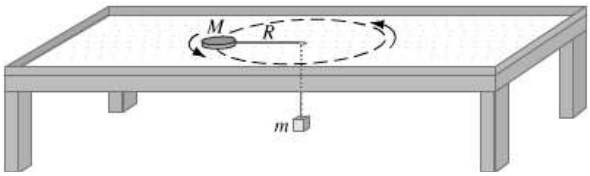
Name: Date:

AP Physics 1. Home 5.2

1. A flat puck $M = 0.25\ kg$ is tied to a string and allowed to revolve in a circle of radius $R = 1.0\ m$ on a frictionless horizontal table. The other end of the string passes through a hole in the center of the table, and a mass $m = 1.0\ kg$ is tied to it.



a) Draw free-body diagrams for the puck and mass.

Puck Mass

b) Calculate the tension in the string F_T.

c) Calculate the acceleration of the puck.

d) Calculate the speed of the puck.

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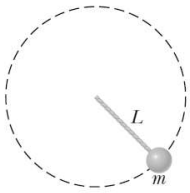
2. A ball of mass $m = 0.28\ kg$ swings in a vertical circular path on a string $L = 0.85\ m$.



a) Draw force diagrams for the ball when it is at the bottom of the circle, when it is at the top, and when the string is horizontal.

Bottom Top Horizontal

b) If its speed is $5.2\ m/s$ at the top of the circle, what is the tension in the string?

c) If its speed is $4.2\ m/s$ when the string is horizontal, what is the tension in the string?

d) If the string breaks when its tension exceeds $F_{Tmax} = 23\ N$, what is the maximum speed v_{max} the ball can have at the bottom before that happens?