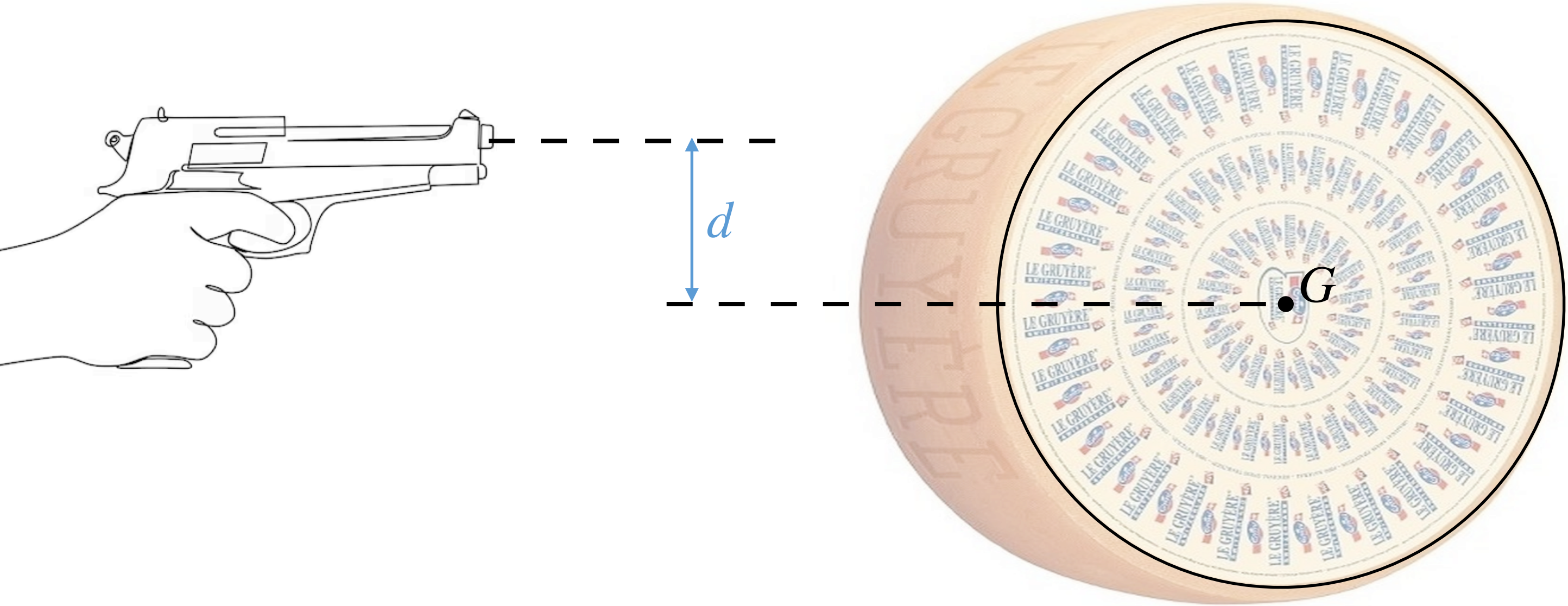


EXERCISES FOR WEEK 15

A cheese wheel with radius R and mass M has a pivot inserted through its center of mass G so that it can turn freely around its axis of symmetry.

Someone fires a bullet with mass m and velocity v_0 , which embeds itself in the rind of the cheese.

What angular velocity does the cheese wheel turn? Neglect gravity.

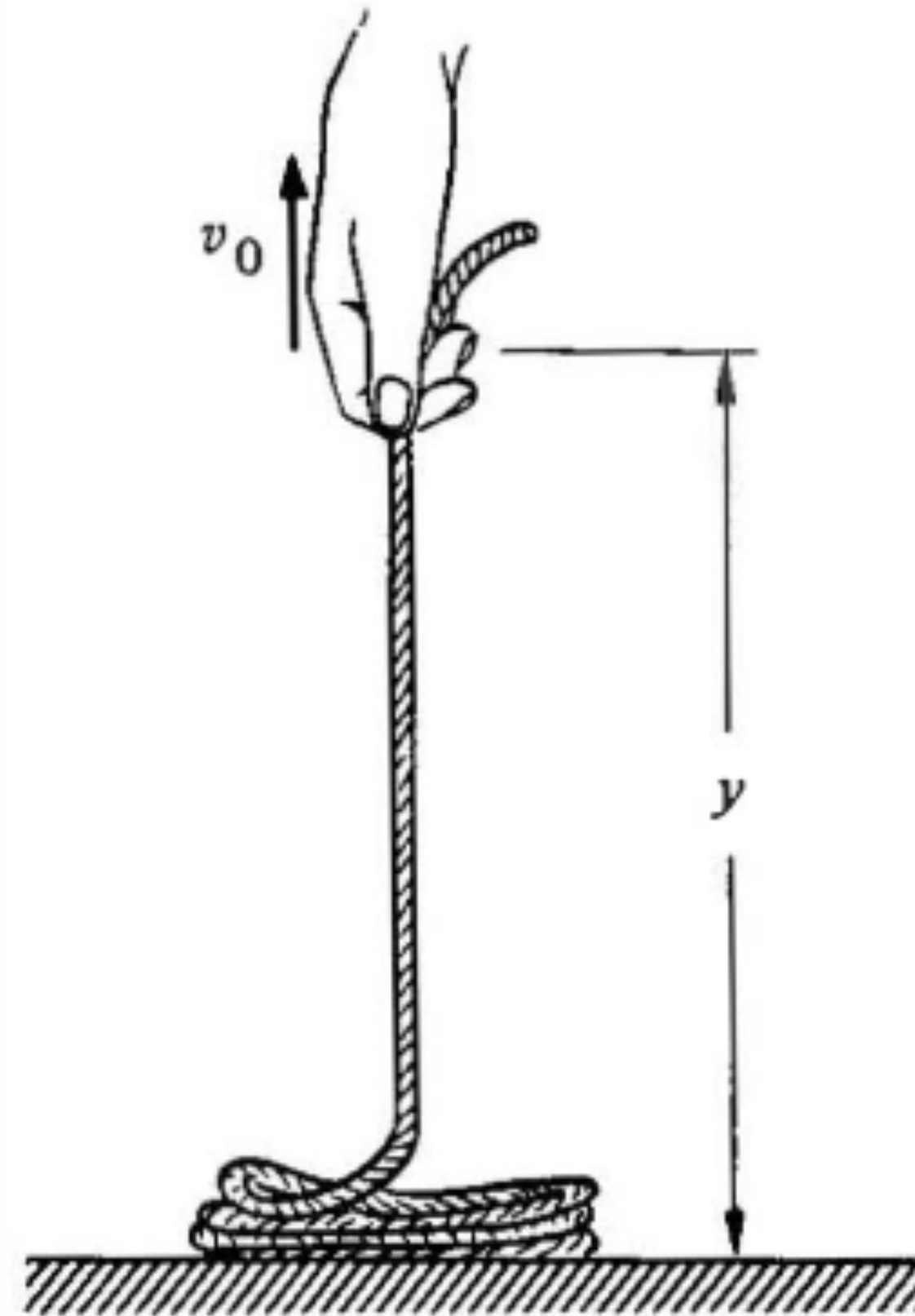


Non-inertial reference frames	50%
Friction	0%
Tension & Pulleys	16%
Work & Power	22%
Conservation Laws (Energy & Momentum)	5%
Problems with variable mass	88%
Harmonic oscillators (free/damped/driven)	72%
Gravity & Orbits	5%
Normal force, circular motion	5%
Center of mass / moment of inertia	33%
Torque & angular momentum for solid objects	38%
Other (please comment below) + collisions	11%

EXERCISES FOR WEEK 15

A uniform rope with linear mass density λ is coiled on a smooth horizontal table. One end is pulled straight up with constant speed V_0 .

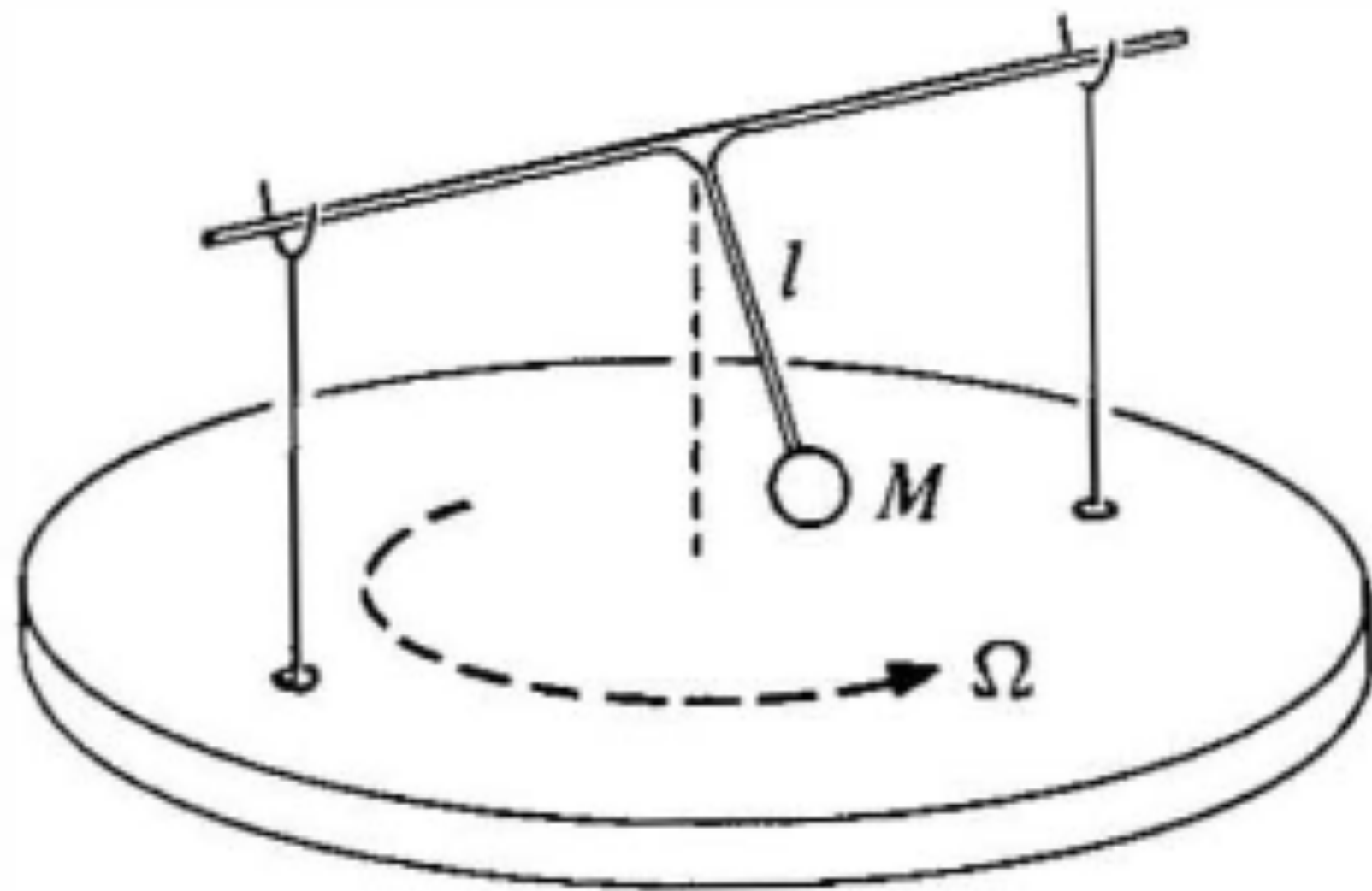
- A) Find the force exerted on the end of the rope as a function of height y .
- B) Compare the power delivered to the rope with the rate of change of the rope's total mechanical energy



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Other (please comment below)	11%

EXERCISES FOR WEEK 15

A pendulum is rigidly fixed to an axle held by two supports so that it can swing only in a plane perpendicular to the axle. The pendulum consists of a mass M attached to a massless rod of length l . The supports are mounted on a platform which rotates with constant angular velocity Ω . Find the pendulum's angular frequency assuming that the amplitude is small.



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EXERCISES FOR WEEK 15

A rod of length l and mass m , pivoted at one end, is held by a spring at its midpoint and a spring at its far end, both pulling in opposite directions. The springs have spring constant k , and at equilibrium their pull is perpendicular to the rod. Find the frequency of small oscillations about the equilibrium position.

