

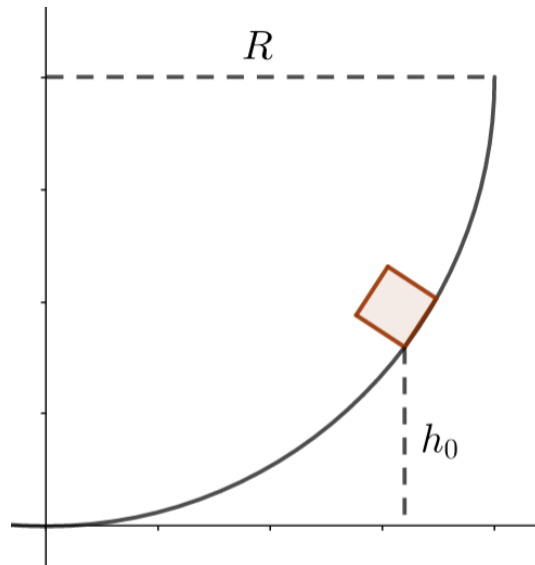
ELEC-C9420 Introduction to Quantum Technology, Fall 21
Midterm exam 1, part B, 28.10.2021
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Problem B1

An asteroid is travelling in space at speed 30 km/s. Suddenly it breaks into two parts, A and B. Part A is twice as massive as part B. The velocities of parts A and B form angles $\alpha_A = 23^\circ$ and $\alpha_B = 15^\circ$ with respect to the initial velocity of the original asteroid.

- Find the speeds of the two asteroid parts after the disintegration. (6p)
- How large was the relative change in the total mechanical energy of the system in the process? (2p)

Problem B2



A small box slides down a semi-circular ramp (radius R). The coefficient of kinetic friction between the box and the ramp is μ . At what height should the box be released from rest in order for it to stop exactly at the lowest point of the ramp? Express the initial height h_0 as a function of the ramp radius R and the coefficient of kinetic friction μ . (8p)