

NORTHERN ILLINOIS UNIVERSITY

PHYSICS DEPARTMENT

Physics 210 – Mechanics & Heat

Spring 2021

Problem Set #10

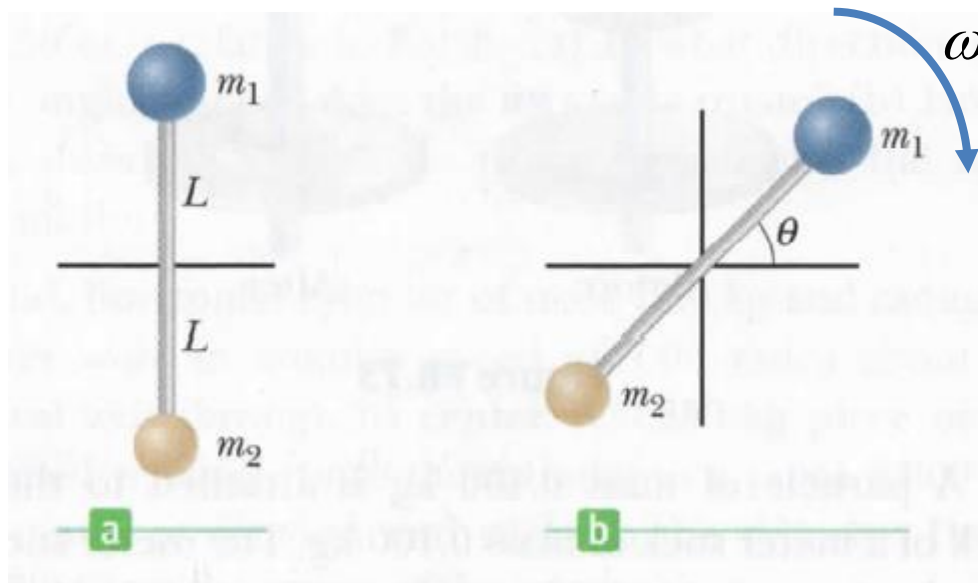
Problem Set Due: Thurs., April 1, 2021

Read OpenStax: Chapter 10.4, 10.5, Lecture Notes #8

Show explicitly all your work for full credit.

- | | |
|------------------------------|-----------------------------------|
| 1. Expert TA: c11.3.1 | <i>conceptual problem—explain</i> |
| 2. Expert TA: c11.4.1 | <i>conceptual problem—explain</i> |
| 3. Expert TA: c11.4.2 | <i>conceptual problem—explain</i> |
| 4. Expert TA: 11.4.2 | show calculation and figure |
| 5. Expert TA: 11.5.1 | show calculation and figure |
| 6. Expert TA: 10.4.1 | show calculation and figure |
| 7. Expert TA: 10.4.5 | show calculation and figure |
| 8. Expert TA: 10.4.11 | show calculation and figure |
| 9. Expert TA: 10.4.12 | show calculation and figure |

Problem #10 is on the next page



10. A light rod (assume it is massless) of length $2L$ is free to rotate in a vertical plane about a frictionless pivot through its center. Two particles having masses m_1 and m_2 are attached to the two ends of the rod.
- When the rod is vertical (as shown in Figure (a)), find the center of mass of the system when $m_1 > m_2$. Find this center of mass relative to the center of the rod (that is, define $y = 0$ to be at the center of the rod).
 - Find the angular speed ω when the system rotates to the angle θ in Figure (b) (that is, find ω in terms of m_1 , m_2 , L , θ , and g). (note: you must use your results in Part (a) to solve this problem).