

NORTHERN ILLINOIS UNIVERSITY

PHYSICS DEPARTMENT

Physics 210 – Mechanics & Heat

Fall 2021

Problem Set #9

Problem Set Due: Thurs., Nov. 4, 2021

Read OpenStax: Chapter 11.1-11.4, 11.7, Lecture Notes #9

There will be a Quiz #3 on Tuesday, Nov. 9

Show explicitly all your work for full credit.

Staple solutions to Problems #1-9 together

Remember: (1st) read the section then (2nd) try to do the problem without looking at the solutions. This will better prepare you for the next Quiz.

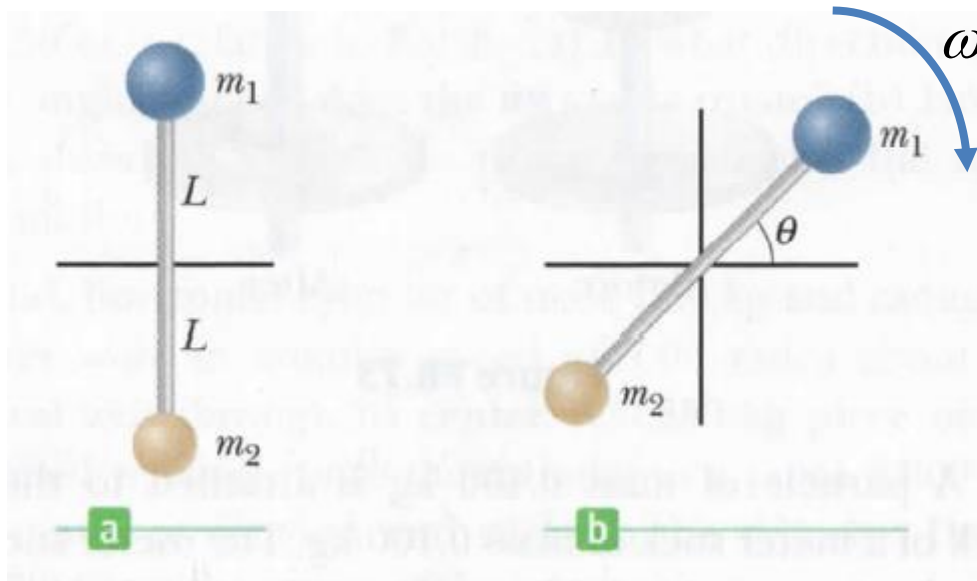
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|-----------------------|-----------------------------|
| 1. Expert TA: 15.1.2 | show calculation and figure |
| 2. Expert TA: 15.1.3 | show calculation and figure |
| 3. Expert TA: 15.2.1 | show calculation and figure |
| 4. Expert TA: c15.4.5 | conceptual problem—explain |
| 5. Expert TA: 15.4.3 | show calculation and figure |
| 6. Expert TA: 15.4.19 | show calculation and figure |

Remember: (1st) read the section then (2nd) try to do the problem without looking at the solutions. This will better prepare you for the next Quiz.

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|----------------------------|-----------------------------|
| 7. OpenStax: Example 11.8 | show figure and calculation |
| 8. OpenStax: Example 11.9 | show figure and calculation |
| 9. OpenStax: Example 11.10 | show figure and calculation |

Problems #10 is on the next page

Staple solutions to Problem #10 together



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).