

NORTHERN ILLINOIS UNIVERSITY

PHYSICS DEPARTMENT

Physics 210 – Mechanics & Heat

Spring 2022

Problem Set #6

Problem Set Due: Thurs., March 3, 2022

Read OpenStax: Chapter 9, Chapter 10.3, Lecture Notes #6a, #6b

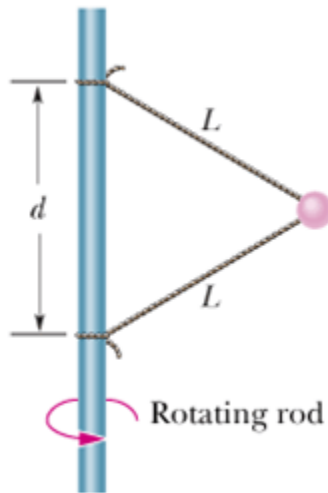
There will be a Quiz #2 on Tuesday, March 8

Show explicitly all your work for full credit.

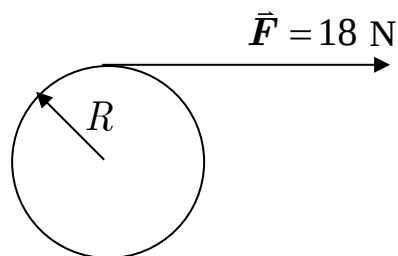
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|----------------------------------|--------------------------------------|
| 1. Expert TA: c12.1.2 | <i>conceptual problem—explain</i> |
| 2. Expert TA: 12.1.3 | show calculation and figure |
| 3. Expert TA: 12.3.1 | show calculation and figure |
| 4. Expert TA: 12.3.4 | show calculation and figure |
| 5. Expert TA: 12.3.6 | show calculation and figure |
| 6. Expert TA: 12.3.11 | show calculation and figure |
| 7. OpenStax: Example 10.7 | page 397 show figure and calculation |

Problem #8 & #9 are on the next pages

Staple Problems #1-7 together separately from “My Problems” below.



8. A 1.34 kg ball is connected by means of two massless strings, each of length $L = 1.70$ m, to a vertical rotating rod. The strings are tied to the rod with separation $d = 1.70$ m and are taut. The tension in the upper string is 35 N.
- Draw the free body diagram for the ball, and label the $\hat{r}$ -direction in the diagram.
 - Write down Newton's 2nd law for the ball along the two axes in your free body diagram (a convenient set is the y -axis and the $\hat{r}$ -direction).
 - What is the tension in the lower string?



9. A disk can freely rotate about an axis going through its center. A force of 18 N is applied to the rim of the disk having a radius $R = 7.0$ cm. If the mass of the disk is 2.4 kg, what is its angular velocity after 5.0 sec?