

Homework 6

Physics 5A

Due Fr 18 / 4 / 24 @ 5:00PM

Note: You have two weeks to complete this problem set.

The clearer your presentation is, the easier it is for us to give you points! "K.K." refers to the 2nd edition of the textbook "An Introduction to Mechanics" authored by Kleppner & Kolenkow.

Remember, you are encouraged to work together, but please make sure the work you turn in is your own.

Problem 1. (5 pts)

A person of mass m is standing on the edge of a railway car of mass M . Both are initially at rest. The person then jumps horizontally off the railway car, during which his legs produce energy E . If there is no friction or other resistance, what fraction of the energy E_M/E is carried by the railway car? Explain in words the limit $m \gg M$ and $m \ll M$.

Problem 2. (10 pts)

K.K. 5.3

Problem 3. (15 pts)

K.K. 5.5

Problem 4. (10 pts)

K.K. 5.8

Problem 5. (5 pts)

K.K. 5.13

Problem 6. (10 pts)

K.K. 5.14

Note: the total force is the sum of the two forces described. If you like, you may assume $x \geq 0$.

Problem 7. (20 pts)

K.K. 5.7

Problem 8. (10 pts)

K.K. 6.1

Problem 9. (10 pts)

K.K. 6.5

Note: when it says $m \ll M$, it actually means you can approximate $\frac{m}{M} \rightarrow 0$, which will drastically simplify the expressions. h is the distance from the bottom of M to the floor, and you may assume the bottom of m is at height $h + l$.

Problem 10. (15 pts)

K.K. 6.6

Problem 11. (10 pts)

K.K. 6.8

Problem 12. (10 pts)

K.K. 6.14