

Physics 2300: Problem Set #1

These problems are due on by classtime on Tues Aug 28. Please upload a scan to the Carmen dropbox. There will also be online quiz to take at essentialskills.osu.edu.

1. Complete the vector review sheet handout.
2. Morin 1.6 p. 14 (yes, the answer is given in the book, but do it on your own before checking!)
3. Morin 1.9 p. 15
4. Morin 1.11 p. 16
5. Morin 1.13 p. 16
6. An elevator ascends from the ground with uniform speed. A time T_1 later, a boy drops a marble through a hole in the floor. A time T_2 after that (i.e. $T_1 + T_2$ after start) the marble hits the ground. Find an expression for the height of the elevator at time T_1 . (Local gravity is g .) What checks can you make?
7. (BONUS– Bonus problems are not required, but will help resolve borderline grades at the end of the quarter.) Consider a projectile thrown on a slope of angle α ($\alpha = 0$ would be flat ground). If we allow ourselves to launch at an arbitrary angle ϕ (defined as the angle relative to horizontal, e.g. $\phi = \pi/2$ is vertical). Find the angle ϕ which maximizes the range of the projectile. Start by commenting on your expectations for the special cases $\alpha \rightarrow 0$, $\alpha \rightarrow \pi/2$ and $\alpha \rightarrow -\pi/2$, which will provide checks on your answer.
8. Shankar, problem 1.3.1 pg. 13. (Don't overlook proving the identities.)
9. Shankar, problem 1.5.2 pg. 25. By “analyze” we mean find any zeroes or singularities, and figure out the asymptotic behavior as $x \rightarrow \pm\infty$, then draw a sketch including these features.
10. Shankar, problem 1.6.2 pg. 26.