

Physics 261: Problem Set #1

These problems are due by the end of the day on Friday, 30 September, in the graders' box in the Smith 1011 (in the lounge).

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 1.10 p. 16
5. Morin 1.13 p. 16
6. Morin 1.16 p. 17 (Clarifying questions: what are the physical dimensions of the parameter α ? What combination of parameters in this problem has the same units?)
7. 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?
8. (BONUS– Bonus problems are not required, but will help resolve borderline grades at the end of the quarter.) In problem 1.10, we consider a projectile launched *perpendicular* to the hill. Now generalize and 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.
9. Shankar, problem 1.3.1 pg. 13.
10. Shankar, problem 1.5.2 pg. 25. (part of the Mathematica session on Thursday Sept 29)
11. Shankar, problem 1.6.2 pg. 26.