

Physics 261: Problem Set #1

These problems are due by the end of the day on Thursday, Sept. 27 in the graders' box. In your solutions, follow the general guidelines in the handout on problem sets. Your solution should include:

- A basic description of the situation and goals (including diagrams usually!). Often a restatement of the problem is helpful.
- Your plan or strategy. How do you plan to solve the problem? Usually you will divide the problem into *subproblems*.
- Details of the solutions.
- Checks of your result(s) if possible.

The most convenient format to use will depend on the type of problem you are solving.

1. Complete the vector review sheet handout.
2. More vector review: Kleppner and Kolenkow, problems 1.1 and 1.2, pg. 47. Bonus: Check your results with Mathematica. [Hint: Use the Help Browser to look up dot product, etc.]
3. Kleppner and Kolenkow, problem 1.6, pg. 47.
The Law of Sines states that in a triangle with sides of length a , b , c , and opposite angles θ_a , θ_b , θ_c , the following relations hold:

$$\frac{\sin \theta_a}{a} = \frac{\sin \theta_b}{b} = \frac{\sin \theta_c}{c}$$

Examine Example 1.1 on page 5 as an example of how to use vector manipulations to prove relations involving triangles.

4. Kleppner and Kolenkow, problem 1.12, pg. 48.
5. Kleppner and Kolenkow, problem 1.13, pg. 48. Find the height of the elevator at T_1 as a *function* of T_1 , T_2 , and g only. Use the answer clue to check your result. What other checks are there?
6. Kleppner and Kolenkow, problem 1.17, pg. 48.

7. (BONUS) Kleppner and Kolenkow, problem 1.21, pg. 49. Bonus problems are not required, but will help resolve borderline grades at the end of the quarter.
8. Shankar, problem 1.3.1 pg. 13.
9. Shankar, problem 1.5.2 pg. 25. (part of the Mathematica session on Wednesday.)
10. Shankar, problem 1.6.2 pg. 25.

Remember to check the 261 WWW page for suggestions!

Supplementary problems. (These are not to be turned in, but are worth doing to learn the material more thoroughly!)

- Chapter 1: 1.5, 1.8, 1.9, 1.15, 1.16