

Physics 151 First Exam Review Suggestions

What you should know by now.

The exam will check your knowledge on any or all of the following:

1. *Create proper data tables and graphs.*

2. *Measurement and Uncertainty.* Can you find the average, standard deviation, and SDM for a data set? Can you describe the difference between standard deviation and SDM? Do you know which one to use in reporting the best estimate and uncertainty of a measurement, and how to determine the correct number of significant figures? Do you understand the difference between accuracy, precision, and systematic error? Can you determine the sources of uncertainty and/or systematic error in an experiment?

3. *Describing Motions with Words and with x , v_x , or a_x vs. t Graphs.* This is covered in Homework for Unit 3: Introduction to Motion and Changing Motion I, and Homework for Unit 4: Changing Motion II. If you have difficulties, reread your observations in Units 3 and 4 and study them. You should describe the motion of objects as standing still, constant speed, slowing down, or speeding up, and moving in the negative or positive direction.

4. *Describing Motions using Vectors and Vector Diagrams.* Can you find the sign of the acceleration using the tail to head method of combining vectors to find the vector Δv_x ? Can you describe whether the velocity of an object is changing by becoming more positive / less negative, or more negative / less positive in order to find the sign of the acceleration?

5. *Describing Motions with Equations:*

a. Linear Equations--Consider the exercises you completed in Unit 1 Section 1.7 and homework exercise 1.6-II (g) in which you worked with a linear relationship for the position of an object as a function of time. What does the fact that the equation is linear tell you about the motion? What do each of the coefficients in a linear equation tell you about the motion of the object? How is the motion of the object different if the slope of the graph increases? If the intercept increases?

b. Quadratic equations--Consider the exercises you completed in Unit 4 Sections 4.5 through 4.8 in which you worked with a quadratic relationship for the position of an object as a function of time. What does the fact that the equation is quadratic tell you about the motion? What do each of the coefficients in a quadratic equation tell you about the motion of the object? How is the equation different if the acceleration of the object being described increases? If it's initial velocity increases? If it's initial position increases? **Hint:** You may also want to think about all the quadratic modeling you did for homework after several of the units. Did you think about what each of the coefficients means in a physical sense?

6. *Collect (perhaps with Logger Pro) and analyze data using spreadsheet, graphing, and modeling skills.*

7. *Solving problems using the kinematic equations.* Can you draw a proper motion (vector) diagram and the associated velocity graph for a particular problem? From the problem statement, can you determine what quantities are known and what quantities are unknown, and make a table of the values (with proper unit conversions)? Can you pick and solve the appropriate equation(s) in symbol form to find the unknown quantities, and then find the numerical answer? (with proper units, significant figures, and vector notation)? In doing so, you might need to solve the quadratic equation and/or take the square root of a number.