1. Sketch a speed-time graph to describe the motion of a falling automobile. (Copy it from RS I.)
   a. Use letters to write an equation describing that graph, as on page 69 in your textbook: ____ = ____
   b. Define each of the letters that you used.
   c. Which two of those letters represent variables? ____, ____ -Which one represents a constant? ____
   d. In what SI unit is that constant measured? ______ -Do 1f & 1g agree? ___ (See #3 on page 12R.)
   e. We measured that constant on page 9 and found that it was between ___ and ___ ______.
   f. On pages 12 & 12R we converted it to SI units. We found that it is between _____ and _____ _____.
   g. The textbook says its value is approximately ___ ______. This value is recorded in #__ on RS I.

2. Automobile crash-testing has become popular in recent years. One simple method is to drop the car as in #1, straight down front-first onto a hard floor. Use the clues below to discover how much time the car must fall freely to make a crash equivalent to hitting a stone wall at normal highway speed:
   a. Show that a speed of 56 mph is equivalent to 25 meters per second.
   b. Using only letters, write the equation describing its speed-time graph as you did in 1a.
   c. Solve it algebraically for the letter which represents falling time.
   d. The acceleration of the falling car is written in 1g, above. The impact speed is given in 2a. Insert those values (with units) into equation 2c to determine the required falling time.

3. Suppose another car falls just half a second longer. Show how the new impact speed can be predicted.

4. Using 7f on RS I, calculate the impact speed that results from a 5% decrease in the original falling time.

5. At 2 PM it takes 3.025 ± 0.025 sec. for a sports car to increase its speed from 0 to 23.7 ± 0.2 m/s.
   a. The given change in speed is ____ ± ___ m/s.
   b. To find the car's acceleration we divide that change in _____ by the given _____ ___________.
   c. The MLV of the quotient = (_____ ____) ÷ (_____ ____), which comes out to be ____ _____. Fill in the blanks with numbers and units, using # 1 on RS I. *Do not round off yet.*
   d. The GLV of the quotient = (_______ _____) ÷ (_______ _____) = _________ _____.
      The SLV of the quotient = (_______ _____) ÷ (_______ _____) = _________ _____.

6. To estimate the ***absolute uncertainty*** of the quotient in 5c you must ____________ the quotient's __LV from its __LV and then divide by ___, as in #17 on RS I. *Don't round off yet.*
   a. We conclude that the car's acceleration was _______ ± ______ _____.
   b. To convert the uncertainty of that result into **"relative"** form, you must *divide it by the MLV* of the acceleration: **Relative uncertainty = _________ divided by _______** = _______
   c. To convert that result into a percentage, we move its decimal point ___ jumps to the _______.

   Percentage uncertainty of quotient = ___%

7. In #5 the given change in speed was _____ ± _____ ______ and the time interval was ____ ± ____ ___.
   * a. Use the method in #6 to convert the uncertainties of those given numbers to percentage form.
   b. The relative uncertainty of the quotient in #6 is ______ ____ the relative uncertainties of the given numbers. (greater than or equal to, smaller than, in between) -Is that true for all quotients? ____

8. Consider the set of all numbers in the range between the SLV and the GLV of the quotient in 5d:
   a. Do the members of that set all have the same first digit? ____ (If so, it is **"significant"**, or worth keeping.)
   b. Do they all have the same *sixth* digit? ___ -Is there any digit (0 through 9) which *could not possibly* appear as the sixth digit of any number in that range? ____ If so, please explain. If not, then we must classify the sixth digit of the quotient as **"bogus"**, or *pure fiction.*
   c. Do the numbers in that range all have the same second digit? ___ If not, please list all of the second digits that can be found in this set of numbers: ________ *If there are fewer than ten possible numerals in that list then we should keep that the second digit because it is significant.*

9. Delete *all but one* of the bogus digits from the acceleration that you found in 5c. Also round off the relative uncertainty found in 6c. (Keeping one bogus digit should be enough to prevent serious roundoff error, as explained on page 67 in the fifth edition PSSC textbook.)

   Acceleration with proper roundoff = _____ ______ ± ____%

10. Round off the answer to 2d in the same way, keeping *one* bogus digit: ____ ____
    From now on you will be expected to round off *all* final results in this fashion. *Don't forget how!*