1. Converting a time interval from minutes to hours is simple if you know the number of minutes in an hour. For example, show how to convert "180 minutes" into hours by using "60 min/hr" as a conversion factor: **[180 min.] ÷ [____ _____ per____] =** _____ _____

2. Converting from ticks to seconds is equally simple if you know the number of _____s in one _____.
   a. What name did we give to that conversion factor in #1 on p. 11? _____ (Copy from RS I.)
   b. If my ticker has a frequency of 50 tick/sec then a time interval of "25 ticks" is equal to ____ sec. As in #1, please *show* how that number is calculated, *with units. Then use the same method in 3c.*

3. Sketch a speed-time graph describing the motion of a freely-falling object. *Copy it from page 9.* Include the two "reasonable lines" mentioned in #5 on that page. Label the axes *with names and units*.
   a. Make dots on the time axis to represent the release and impact times. Label them "T_1" and "T_2".
   b. Using the data saved from page 9, write their numerical values (with units) beside the dots.
      Falling time interval = (____ ____) - (____ ____) = ____ ____.
   c. To convert that time interval from "ticks" to "seconds" I must _____ it by the ticker's frequency.

4. The object's "acceleration" is the _____ of that graph. *Is that definition also recorded RS I?* ___
   To calculate the object's acceleration we divided its **change** in _____by that falling time. When we did that on page 9 we used non-standard units. In 3b we showed how to convert the "falling _____ _____" into standard units. *Now* we need to convert the "_____ in _____" into standard units:
   a. To convert a speed from mi/min to mi/hr you multiply by the number of _____s in one _____.
   b. To convert a speed from cm/tick to cm/sec you _____ it by the number of _____s in one _____.
   c. For example, if my ticker frequency is 50 tick/sec then a speed of 3.0 cm/tick is equal to _____ ____.

5. We measured the ticker frequency several times on page 11, using intervals of roughly ____ sec.
   a. In *range* form, we found the frequency was probably between _____ and _____ _____.
   b. The uncertainty of our measuring process was found to be roughly ± ____tick/sec, or ____%.
   c. On page 11 we found that the frequency measurement can be made twice as precise (reducing its uncertainty to about _____ of its former value) by using a time interval that is ____ times longer.
   d. Increasing the time interval by a factor of *three* causes the percentage uncertainty to be divided by __.
   e. Multiplying the time interval by "N" causes the percentage uncertainty to be _____ed by ___.
   f. To measure the ticker frequency with a precision of ± 1% you could multiply the original time interval (in #5) by ___, which means you would run the ticker for about ____ seconds.
   g. You may make that improved measurement now if it seems necessary.

6. The best available value for our ticker's *frequency* is "between _____ and ____ ____s per _____". *Use the plan in 3c* to convert the falling time in 3b to standard units. The result will be in *range* form.
   a. ***GLV of falling time*** = (_____ ticks) ÷ (____ ____s per ___) = _____ ____
   b. ***SLV of falling time*** = (_____ ___) ÷ (____ _____ _____) = _____ ____

7. Starting at the two dots on the time axis in your sketch, make vertical lines, parallel to the speed axis. Make dots at the four points where those vertical lines intersect the two "reasonable lines". Use your data table or the graph on page 9 to determine the speeds corresponding to those four points. Record those speeds clearly on the speed axis of your sketched graph. *Don't forget their units.*
   a. According to the *steeper* line on the graph, the speed increased from _____ to _____ _____ during the chosen time interval. To calculate the change in speed, we must _____ those two numbers. We find that the **GLV of the change in speed =** _____ _____.
   b. According to the less-steep line, the speed increased from _____ to _____ _____ during that same time interval, so the **SLV of the change in speed is** _____ _____.

8. To convert a "change in speed" from cm/tick to cm/sec you multiply by the number of _____s in one _____, as in #4. That conversion factor is called the "_____" of the ticker. (See page title.)
   a. To convert the GLV of the change in speed from cm/tick to cm/sec you must multiply the __LV of the change in speed (in #7) by the __LV of the frequency recorded above in # ___:
      GLV of _____ ___ _____ = (____ _____)(____ ____) = _____ _____
   b. Similarly, the **SLV of the change in speed = (____ ____)(____ ____) =** _____ _____

* 9. Use the data in 6 and 8 to calculate the falling object's acceleration in range form, using standard units. Show clearly how that range is calculated. Don't forget the SI units. *Save a copy for use on page 13.*