First Celebration of Knowledge Review: As promised, here is your list annotated with comments and examples. Please be forewarned: You could memorize everything on this list and still not understand. We are looking for understanding and ability to apply, not for memorization skills.

Variable	A variable is something that might affect an experiment.
Independent/dependent variables	Independent variables are controlled by you; dependent variables "depend on" the independent variable In the pendulum experiment, you controlled length, mass and angle. Those were the independent variables. The period (time of swing) of the pendulum was measured – that was the dependent variable.
Control of variables	This is related to the concept above. If you want to know the effect of one variable, you must control all others.
Prediction and testing	You've done a lot of this. A prediction should not be a wild guess – it should be an educated guess based on what you already know. When a prediction is tested, you need to follow the guideline suggested in "Control of variables."
Groups are better than individuals	You've probably figured out by now that 3 (or 4) heads are better than one. You can pool information, help each other out, etc.
Measurement	Remember the "thickness of a page" experiment: our measuring devices limit our ability to take a measurement. Measuring compares to a standard. Taking numerous readings and getting an average gives the best value, because all measurements contain uncertainty. Some measurements are too high, some too low. Averaging essentially cancels out the highs and lows to give us the best possible value.
Average	The sum of the individual values divided by the number of values. An average provides the best estimate of the value of a measured quantity (see Measurement).
Operational definitions	An operational definition is a definition that tells what you are doing/measuring and exactly how you are going to do/measure it. It must make clear what you are going to need to do to find a particular quantity or make a specific test. For example, in Exercise 6.11 you discovered that question D couldn't really be answered unless you had an operational definition of "bigger." Operational definitions are important for clear communication in science.

Significant figures	The smallest division on your measuring device determines the number of significant figures that can be reported for a measurement. If your ruler has millimeters as the smallest division, you could probably make a good estimate of a measurement to within the nearest half-millimeter. This means that you could report a measurement as 3.5 mm. The 5 represents a half-millimeter. You could NOT report 3.569 mm, because your ruler is not capable of being read to that many decimal places. This same idea carries through to calculated numbers. If you measure something 3 times and get 3.5 mm, 3,3 mm, and 3.6 mm, then take an average, your calculator tells you 3.46666666667 mm. You can't report it that way because your ruler can't measure to that many decimal places: you must report 3.5 mm as the average (rounded value).
Balance	This is either a verb or a noun: as a verb, it means to have a situation where there is the same turning effect (see below) on both sides of a fulcrum (see below); as a noun it is a device that is used to create this situation.
Turning effect	Both mass and position from the fulcrum affect the turning effect. When the turning effects are the same on both sides of the fulcrum, a balance condition is achieved. The relationship you developed was $M_1L_1 = M_2L_2$ where M_1 is the mass on the left, L_1 is the distance from the fulcrum on the left, M_2 is the mass on the right, and L_2 is the distance from the fulcrum on the right. If there is more than one mass on either side, you would add that mass's turning effect to the appropriate side.
Fulcrum (pivot)	The point about which the balance arm turns.
Mass	The starting definition of this was the number of square nuts that would balance an object. Later, you extended this to the standard mass unit, the gram.
Standard units	Measurements make more sense when everyone uses the same references to do the measurements. That's what standard units are – the reference values that everyone will use.

Rider	The rider was the little slider that was on the commercial balances. It is used to make fine adjustments to the turning effect on one side of the balance.
Uncertainty	Every time you take a measurement, you get a slightly different value. This is uncertainty. To find the uncertainty of a measuring device, you can measure something a number of times, then take the average. The difference between the average and the measurement that is furthest from the average is a reasonable estimate of the uncertainty. Sometimes you can make an estimate of the uncertainty just from the device. For example, the smallest division on a metric ruler is 1 mm. You can probably read a measurement with a ruler to within a half-millimeter. This would mean the value you obtain would have an uncertainty of about 0.5 mm. A measurement of 12.35 cm with an uncertainty of 0.03 cm would be reported as 12.35 ± 0.03 cm.
Accuracy	This is a measure of how close you are to a “true” value or accepted value. For example, if a true value is 6.98 m and you measured 6.98 m, that would be an accurate measurement. Groups of measurements can be accurate (or not) as well. Suppose you measured the object above several times and got 6.96, 6.98, 6.97, 7.00. The average of these is 6.98 m, so you have an accurate measurement. It is possible to be accurate but not precise (see below).
Precision	This is essentially related to how well you took your measurements. If your measurements are precise, they will all be very close to each other in value. For example, the measurements 6.97, 6.98, 6.99, 6.98 represent a group of precise measurements. The group 6.24, 6.93, 6.05, 7.12 is not a precise group of measurements. It is possible to be precise but not accurate (see above).

Area	You learned that area was the number of standard squares that fit into the boundary of a figure. The standard square unit used is the square cm (cm^2), which is a square that is 1 cm on a side. You found that L x W doesn't always give the number of standard squares – this only works for rectangular objects.
Surface area	Like area, it is the number of standard squares that fit in a boundary. In this case it is the boundary of the outside surface of a 3-dimensional object.
Volume	Now we use standard cubes instead of standard squares, but the concept is the same. The volume is the number of standard cubes that can fit in the space taken up by an object. The standard cube you used is the cubic centimeter (cm^3), which is a cube that measures 1 cm on a side. Another way to measure volume is by water displacement. When the object to be measured in submerged in water, it displaces an amount of water equal to its volume. In this case, the volume measured is in milliliters. You should also have discovered that 1 ml was equal to 1 cm^3. You found that L x W x H doesn't always give the number of standard cubes. This only works when the object to be measured is a rectangular solid.

Ok – that's where we were as of Thursday. This should give you an idea of how to set up a review sheet. You can finish it for the material we do on Tuesday. Then you should be able to do your own for the next Celebration of Knowledge!