Hubble's Law Calculations

1. By looking at your scatter plot, you should see a trend in the data. As the distance increases, the velocity ___________________________.

2. We can show this trend with a line of best fit. Use a straight edge to draw a line of best fit on your graph.

3. Determine the slope of your line by using two points: the origin and one point high up along the line. Remember, slope is determined by the following:

$$slope = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\_\_\_\_\_\_\_\_\_\_ - \_\_\_\_\_\_\_\_\_\_}{\_\_\_\_\_\_\_\_\_\_ - \_\_\_\_\_\_\_\_\_\_} = \_\_\_\_\_\_\_\_\_\_\_\_$$

4. What would be the units for the slope of this equation? (Hint: What are your *y* value units? What are your *x* value units? What operation did you use to calculate the slope?) ________________________

5. Notice that there are distance units in both in the numerator and the denominator. These can cancel each other, if you make both distance units the same. Do this by using 1 million light years, or 1Mly = 9.46×10^{18} km.

$$slope = \frac{\_\_\_\_\_\_\_\_\ km/s}{\_\_\_\_\_\_\_\_\ Mly} = \_\_\_\_\_\_\_\_\ \frac{km/s}{Mly} * \frac{1Mly}{9.46 \times 10^{18}\,km} = \_\_\_\_\_\_\_\_\_\_\ \frac{1}{s} = H_o$$

6. H_o is known as the Hubble constant. Notice the units are 1/time. If you want to calculate the age of the universe, you need to get the reciprocal of H_o. What is the age of the universe (in years) according to your calculations? (Remember to convert from seconds to years.)

______________________________ yrs

7. The actual value of Hubble's constant is H_o = 21.8 km/s/Mly. This leads to the age of the universe being 13.7 billion years. How close is your age to this figure?