Determining the Age of the Universe

The Hubble Law, equation (C), can be used to determine the age of the universe. Using *your* average value of H, calculate the recessional velocity of a galaxy of a galaxy which is 800 Mpc away.

Velocity of a galaxy 800 Mpc away: _____km/sec

Verify your velocity by looking it up on your Hubble diagram.

You now have two important pieces of information:

1. How far away is the galaxy.
2. How fast it is moving away from us.

You can visualize the process if you think about a trip in your car. If you tell a friend that you are 120 miles away from your starting point and that you traveled 60 miles per hour, your friend would know you had been traveling TWO hours. That is your trip started two hours ago.

Now let's determine when this galaxy "started its trip". The distance is 800 Mpc, but first convert Mpc into km because the rate, or velocity, is in km/sec.

800 Mpc = _____km

Use equation (E) to determine how many seconds ago the universe started:

_____secs

There are about 3.15×10^7 seconds in one year. Convert your answer into years:

_____years

This is an estimate of the age of the Universe. As we discussed in class, this estimate depends on some important assumptions, mainly that the galaxy was moving at the same speed in the past as today.

One final question: suppose that you had used a galaxy that was 400 Mpc away, instead of one at a distance of 800 Mpc, in making this calculation. Would the final answer have come out the same? Why or why not?