Hubble Expansion

Using the 2001 Hubble Space Telescope data we have picked out a set of galaxies, and plotted them on a graph. This is known as a 'Hubble diagram'. It should look familiar to you from the activity with the two-dimensional universe.

All the galaxies lie roughly along the straight line. Pick any point along the straight line. You can read off its distance and speed. This tells you how fast a galaxy at that distance from the Milky Way would appear to be moving away from you.

Distance of galaxy =_____Mpc Speed = _____km/s

If you know the distance it has traveled from the Milky Way Galaxy, and the speed it appears to be moving at, you can work out how long ago it 'set off' on its journey away from us (time = distance ÷ speed).

Time since set off = _____ Mpc per km/s

(Note: Instead of cm, we are using a bigger unit of distance: a Megaparsec. Remember, 1 parsec is the distance to an object that has a parallax of 1 arcminute. 1 Megaparsec = 1 million parsecs, or 3.25 million light years. This is the typical distance between neighboring galaxies.)

To convert Mpc per km/s into billion years: 1 Mpc per km/s = 1000 billion years (approximately).

Time since set off = _____ billion years

2. Pick another point along the line and try the same thing.

Distance =_____Mpc Speed = _____km/s

Time since set off = _____ Mpc per km/s

= _____ billion years

What do you notice?_____

3. If all the galaxies in the Universe lie on this straight line (or close enough), how long ago did all the galaxies 'set off' on their journey?

What would have happened at that time?

Here are some of the galaxies we used:

	Name of galaxy or galaxy cluster	*Distance (Mpc)*	*Speed (km/sec)*
1	NGC 1425	20.89	1465
2	NGC 3198	13.68	848
3	NGC 5253	3.25	800
4	Abell 2634	114.9	8930
5	Coma	85.6	7143
6	Ursa Major	19.8	1088
7	Cen 30	43.2	3272
8	Cancer	74.3	4982
9	NGC 0383	66.6	4924
10	NGC 925	9.12	374