

Data Analysis

Hubble's Constant

Hubble's law expresses the relationship between the velocity that a galaxy is moving away from Earth and its distance from us. The ratio of these variables is a constant called Hubble's constant. Hubble's constant can be estimated by finding the slope of a graph of velocity versus distance for a set of galaxies. Data for six galaxies are provided in the table at the right.

Hubble's constant is one of the most important and debated numbers in astronomy. It expresses how fast the universe is expanding, and can be used to estimate the age of the universe.

1. **Using Tables** Which galaxy is moving away the fastest? Which galaxy is closest to Earth?
2. **Graphing** Graph the data shown in the table. Place velocity on the vertical axis and distance on the horizontal axis. What is the general shape of the graph?

Velocity and Distance of Galaxies

Galaxy	Velocity (km/s)	Distance ($\times 10^6$ light-years)
1	4,200	200
2	7,800	390
3	10,500	520
4	17,000	850
5	21,000	1110
6	24,000	1170

3. **Calculating** Estimate Hubble's constant by measuring the slope of your graph. (*Hint:* Draw a line through the data points. Recall that $\text{Slope} = \text{Rise} \div \text{Run}$.)
4. **Inferring** About how fast is a galaxy receding if its distance is 2000×10^6 light-years? (*Hint:* Use your estimate of Hubble's constant from Question 3.)
5. **Predicting** Use your value for Hubble's constant to estimate the distance of a galaxy that has a velocity of 30,000 km/s.

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