

# Hubble Expansion

|    | <b>Name of galaxy or<br/>galaxy cluster</b> | <b>Distance (Mpc)</b> | <b>Speed<br/>(km/sec)</b> |
|----|---|-----------------------|---------------------------|
| 1  |   |                       |                           |
| 2  |   |                       |                           |
| 3  |   |                       |                           |
| 4  |   |                       |                           |
| 5  |   |                       |                           |
| 6  |   |                       |                           |
| 7  |   |                       |                           |
| 8  |   |                       |                           |
| 9  |   |                       |                           |
| 10 |   |                       |                           |

## Age of the Universe

$$V = H_0 d$$

The estimated of age of universe (or time since the Big Bang) =  $1/H_0$   
Find  $H_0$  by working out gradient of best-fit line.

BUT! Need to get units right, so

Either:

- 1 Mpc =  $3.25 \times 10^6$  light years
- 1 light year = distance light can travel in one year
- Speed of light = 300, 000 km/sec

Or:

Factor to convert gradient to billion years =  $1000 \times 1/H_0$