

Big Bang Balloon Lab



PURPOSE

The purpose of this lab is to simulate (model) the expansion of the universe.

MATERIALS

- Balloon
- Permanent marker
- Measuring Tape
- Clip

PROCEDURE

1. Partially inflate your balloon, twist the end, and use the clip to seal it, but **do not tie it**.
2. Use the marker to make six dots on the balloon in **widely scattered locations**. Label the dots A-F. Each dot represents a galaxy formed in the early universe.
3. **Without letting air out of the balloon**, use the measuring tape to measure the distance **from A** to each other dot. Record the distances in the worksheet table under the heading "Initial Distance"
4. **Without letting air out of the balloon**, inflate the balloon with one more full breath. Again, measure the distances to each of the dots, and record the distances under "Trial 1" on the worksheet.
5. Inflate the balloon in one breath increments *two more times*. After each inflation, measure and record the distances on the worksheet.

DATA

Balloon Point	Distance from A (in mm)				TOTAL CHANGE (Trial 3 – Initial)
	Initial Distance	Trial 1	Trial 2	Trial 3	
B					
C					
D					
E					
F					

ANALYSIS

1. In your model, what distance changed the most?
2. In your model, what distance changed the least?
3. If each dot represents a group of stars, describe the motion of these groups relative to one another.
4. Based on your model, is the universe expanding, contracting, or staying the same?

5. Based on your model, how does the distance between the objects effects how quickly the objects are moving away?
6. How is your model similar to reality and how is your model different?
7. What are some of the advantages and disadvantages of using your model to study the Big Bang Theory?
8. If dot A is our galaxy, would dots B, C, D, and E be red-shifted (moving AWAY from us) or blue-shifted (moving TOWARDS us)?

Dot	Red or Blue Shifted
B	
C	
D	
E	
F	

GRAPH

Construct a multi-line graph displaying the distance of each dot from A for each trial. The trial number (time) should be your x-axis. The distance from A should be your y-axis. You should have a line for each letter B-E.