



Unit 1: Astronomy

Name: _____

Date: _____

Block: _____

Big Idea: We can model the expansion of the universe to better understand expanding space.

Introduction

In this lab, you are going to create a model of the expanding universe. In 1929, scientist Edwin Hubble made a crucial observation of the universe which is known today as **Hubble’s Law**. This law states that objects in the universe appeared to be moving apart from each other. Furthermore, the farther a galaxy was from an observer, the faster it would move. This observation was used as the basis for Hubble’s Variable, an estimate of the galaxy’s **rate of expansion**.

Materials

- 1 large balloon
- 1 thick black marker
- 1 paper clip

Procedure

1. Partially inflate the balloon using 1 breath.
2. Use the black marker to make 10 dots on the balloon and number them #1 to #10.
3. Inflate the balloon fully using 1-2 more breaths, until it is just larger than the size of your fist.
4. Bend the end of the balloon down and use a paper clip to secure the opening so that no air escapes.
5. Record what happened to the dots in **Observation Table A**. Be specific!
6. Measure and record the distance between dot #1 and the closest neighbouring dot using your flexible metric ruler. Carefully bend the ruler to measure the distance, without compressing the balloon. Measure in millimeters. Repeat for other dots and record your data in **Observation Table B**.
7. Roughly double the size of the balloon by inflating it slowly with 2-3 breaths.
8. Repeat steps 6 and 7 and record the data in your **Observation Table B**.

Observation Table A

<p><i>(Step #5) Record what happens when you inflate the balloon.</i></p>	
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Observation Table B

	<i>Partially Inflated</i>	<i>Fully Inflated</i>
	<i>Initial Distance from Dot #1 (mm)</i>	<i>Final Distance from Dot #1 (mm)</i>
Dot #	Ruler Measurement	Ruler Measurement
2		
3		
4		
5		
6		
7		
8		
9		
10		

Analysis Questions

1. If the dots represent **galaxies**, how do they change as the balloon expands? –Use evidence from your lab. Why do you think this occurs?

2. What relationship exists between the **speed** of the galaxies moving apart and their initial **distance** from one another? Name this Law.

