

## Big Bang Evidence Organizer

Essential Question: **What happened at the very beginning of our universe?**

Try to find evidence about what happened to:

- **Matter (atoms and elements)**
- **Energy (waves/temperature)**
- **The size and motion of the universe**
- **Time (how long ago was the beginning)**

**Resources: Choose based on your reading level**

**Level 3: This is the best most detailed source!**

- WMAP Science Team. "Cosmology: The Study of the Universe." NASA's Wilkinson Microwave Anisotropy Probe. last modified June 6, 2011, for <http://map.gsfc.nasa.gov/universe/>

**Level 2:**

- Freshko, Michael and National Geographic Staff, "Origins of the Universe 101," National Geographic, accessed February 24, 2020. <https://www.nationalgeographic.com/science/space/universe/origins-of-the-universe/>
- Nasa Science: Share the News, "Universe What We Study: The Big Bang," Accessed February 24, 2020. <https://science.nasa.gov/astrophysics/focus-areas/what-powered-the-big-bang>
- Tarbuck, Edward J. and Lutgens, Frederick, K. "Earth Science." Pearson. 2011. Ch 25 Beyond our Solar System, Pgs. 718-721.

**Age of the Universe**

- Siegel, Ethen, "How Do We Know the Age of the Universe?" Forbes. Accessed February 27, 2020. <https://www.forbes.com/sites/startswithabang/2016/04/29/how-do-we-know-the-age-of-the-universe/#241d71816155>

**Level 1:**

- Nasa Space Place. "What is the Big Bang?" <https://spaceplace.nasa.gov/big-bang/en/>

Or

- Regents Earth Science, "Evidence of the Big Bang." (The Big Bang) Astronomy. [https://hsd1-my.sharepoint.com/:b:/g/personal/kberry\\_helenaschools\\_org/EaTkvg2Ba3tOrTJHHW4etQQBODO7eWfB2vTpmir71KQcZg?e=Hp4oWe](https://hsd1-my.sharepoint.com/:b:/g/personal/kberry_helenaschools_org/EaTkvg2Ba3tOrTJHHW4etQQBODO7eWfB2vTpmir71KQcZg?e=Hp4oWe)

How to use the note catcher below:

- One source (article) can have more than one piece of evidence. Remember, we are looking for evidence that explains the **matter, energy, motion and size** of the universe, so try to find at least 3.
- Start by looking for sentences that state observations made, or data collected by scientists. What is the pattern? Summarize it in your own words.
- Look for reasoning to explain what is causing that thing to happen. Look for an explanation in the text, or explain it based on what you know.
- Finally, relate this piece of evidence back to our essential question: **What happened at the very beginning of our universe?**

Now, pick an article and read through it with this lens. Look for evidence and fill out the table below. Do not stop once you have the first 4 boxes filled. Look for as much evidence as you can!

Evidence Source (article, website, etc.)	Pattern you notice (what is the observation/evidence?)	What is causing that pattern?	How does this relate to our essential question? <b>What happened at the very beginning of our universe?</b>
<p><i>Example:</i>  <a href="https://map.gsfc.nasa.gov/universe/bb_tests_exp.html">https://map.gsfc.nasa.gov/universe/bb_tests_exp.html</a></p>	<p><i>Example:</i>            We observe that galaxies are red-shifted. They emit redder light than we expect them to based off their temperature, size, distance and composition.</p>	<p><i>Example:</i>            These galaxies must be moving away from us (quickly), which shifts the wavelengths of light they produce toward the more stretched out red wavelengths.</p>	<p><i>Example:</i>            This relates to our essential question because it suggests the universe has been and is expanding.</p>
<p>Matter: Mrs.G talked about it in class</p>	<p>The abundance of hydrogen and helium (75:25)</p>	<p>The universe had to cool down in order for atoms to form, so only small atoms are in abundance.</p>	<p>The kind of matter we have supports that our universe was very hot and has not yet made an abundance of large elements. Temperature cools by expansion of the universe.</p>
<p>Energy/Temperature:</p>			
<p>Motion:</p>			
<p>Size/Time:</p>			

When you have gotten through all of this see Mrs. Gillin for the next step. She will check your material so bring your computer with you.