



Science 10 Learning Guide 6/7

Choose a topic related to Astronomy **from the table below** and create a visual presentation that includes a description, picture and explanation of the topic as well as an explanation of how your topic relates to the “The Big Bang” or “modern astronomical observations”. The topic must be **Pre-approved By Your Teacher**. Formats for the project can be Digital (PowerPoint, Prezi, etc), poster (no glitter!), essay, comic strip, or other pre-approved formats (**Again, check with your teacher**). **The presentation will be marked using the rubric included in this guide**. You must have at least three different types of sources referenced (ie. books, articles, websites, Youtube videos, etc).

****Choose ONE of the following topics, Big Bang OR Modern Astronomical Observations**

Big Bang

Find out the major events of the Big Bang Theory. **Make sure to include AND describe:**

- How the density and temperature of the universe changed over time
 - How the various forces in the universe came to be
 - How particles of matter, and then the different elements were created
 - How matter coalesced: the emergence of galaxies, nebulae, stars and planets
 - Include the times of the various key events as well
- Enough Information; Side, Pages, etc. **ASK YOUR TEACHER**
- **Show your teacher your First Try / Rough Draft**

Possible Resources to Use:

-[Cosmic History](#) overview by National Aeronautics and Space Administration.

-[The Astronomy Book: Big Ideas Simply Explained](#) by DK Publishing.

-[The Big Bang, Beginning of Time](#) by the University of California.

--[The Evolution of the Universe](#) ed. by David L. Alles, Western Washington University.

-[Our Expanding Universe: Age, History & Other Facts](#) by Charles Q. Choi, Space.com.

-[Timeline of the Big Bang](#) by Physics of the Universe.

-[The Beginning of Everything -- The Big Bang](#) by In a Nutshell.

- [A Brief History of the Universe](#) by Crash Course Astronomy.

-[Explaining The Big Bang One TRILLIONTH Of A Second At A Time](#) by Science Plus.

****These are just POSSIBLE resources, you can find others as well****

OR

Modern Astronomical Observations

Possible Topics	Resources
<p>EXOPLANETS Various methods of searching for exoplanets. Should include a discussion of at least three different ways exoplanets are detected. Should also include a discussion of what is meant by the “Goldilocks” zone and a discussion of Earth-like planets found by NASA’s Kepler Telescope (ex. Kepler 22b and Kepler 438b)</p>	<p>-New Scientist – How Many Earths? -YouTube – Crash Course Astronomy: Exoplanets -NASA – Exoplanets Resource</p>
<p>JAMES WEBB SPACE TELESCOPE NASA’s newest telescope. What was the JWST designed to detect? What has it discovered so far? Where is it located and why was it launched there?</p>	<p>-NASA : James Webb Space Telescope (explore links here) -JWST : Webb Space Telescope (explore links here) -Quantum Magazine : JWST article (long read, but really good) -PBS Space Time: Youtube video</p>
<p>GRAVITATIONAL WAVES What are gravitational waves? What is the Laser Interferometer Gravitational-Wave Observatory (LIGO)? How does LIGO detect gravitational waves? What has LIGO discovered so far?</p>	<p>-Caltech – LIGO (explore links) -Veritasium – LIGO video</p>
<p>DARK ENERGY The initial optical telescope studies of Type IA supernovae that discovered Dark Energy and The Smithsonian Astrophysical Observatory in Cambridge’s use of the Chandra X-Ray Observatory, which informed us as to why the universe is expanding.</p>	<p>-YouTube Big Mysteries: Dark Energy video -Space.com: Mysterious Dark Energy Confirmed By New Method -Hubble site: What is Dark Energy?</p>
<p>BLACK HOLES What is the Event Horizon Telescope (EHT)? How is the EHT able to detect black holes? What is a black hole?</p>	<p>-Event Horizon Telescope – Webpage (explore links) -Space.com – Event Horizon Telescope -Veritasium – EHT video</p>
<p>COSMIC BACKGROUND RADIATION The use of the NASA’s COBE & WMAP satellites to investigate Cosmic Background Radiation, giving us evidence of what conditions were like during the early stages of the Universe’s development</p>	<p>-YouTube PBS Digital Studios: Cosmic Microwave Background Explained - Various NASA Web-articles when Googling: Wilkinson Microwave Anisotropy Probe - NASA LAMDA Cosmic Microwave Background Radiation</p>
<p>REDSHIFT and the EXPANDING UNIVERSE Edwin Hubble’s use of telescopes to determine Spectral Redshift and how it provides evidence of an Expanding Universe.</p>	<p>- YouTube SciShow Space: Is the Universe Expanding? - Australia Telescope National Facility: Edwin Hubble & the Expanding Universe -Space.com – Redshift and Blueshift -NASA – Redshift animations</p>
<p>MEASURING COSMIC DISTANCES Giovanni Cassini, Friedrich Bessel & many others: Use of telescopes and Geometry (math) to calculate Parallax to accurately describe distances to other celestial objects including stars, helping us greater understand the size of the universe.</p>	<p>- YouTube Ted-Ed: Light seconds, light years, light centuries: How to measure extreme distances - Space.com: What is Parallax? - UCI Lecture 16: Measuring Cosmic Distances</p>

Guide Write up/Presentation CRITERIA:

Concept/Description (What you need to do)	Mark
Description, Picture, and Explanation of topic.	20
Explanation of how topic is related to either Big Bang or Modern Astronomical Observations	15
Presentation is APPEALING and Colourful Showing effort.	5
Presentation is ORGANIZED and LOGICAL.	5
A REFERENCE PAGE (SOURCES) is included.	5
Total	50