

# JOURNEY THROUGH TIME

Exploring the Universe with the Speed of Light

## Part One - Calculating "Look-Back" Time

1. Choose at least three different objects in space: a star, a galaxy, and a nebula.
2. Research the distance of each selected object from Earth. You can use reliable sources like astronomy websites, textbooks, or scientific articles.
3. For each object, complete the table and calculate the "look-back" time by determining how long ago the light we are seeing from that object actually started its journey. Remember, this is calculated as distance (in miles) / 186,000 (speed of light in miles per second).
  - a. Example) The moon is 240,000 miles away from us. Light travels at about 186,000 miles a second, so the look back time ( $240,000/186,000$ ) is about 1 and  $1/3$  seconds.

### Workspace

<i>Name</i>	<i>Object Type</i>	<i>Distance</i>	<i>"Look-Back" Time</i>

## Part Two - Graphing

1. Mark the distances of your objects selected in part one on the x-axis of the graph.
2. Connect each marked point on the graph to the origin (0,0) to represent the "look-back" time corresponding to each distance.
3. Observe how the "look-back" time increases as the distance from Earth increases.

Look  
Back  
Time

Distance

**Consider...** the significance of the increasing "look-back" time as distance from Earth increases. Consider how this might reflect the idea that observing objects in space allows us to peer deeper into the past of the universe, and how we have used this to understand the evolution of the universe.



## Reflection

1. Why does the light from distance objects take so long to reach us?
2. How does the speed of light influence our understanding of the universe's history?
3. Consider an object in deep space that is billions of light years away, and its "look-back" time is close to the time of the Big Bang. What are some things you think such an object could tell us about the universe?