

Name: _____

Pd: _____ Date: _____

A Timeline of the Universe Field Challenge Lab

Astronomy



Introduction: Let the challenge begin! In this challenge, the universe is compared to the yard lines on a football field just so that we can get an idea of what that time line looked like. Let's see who can back track the yardage to years of history and map it out correctly, first! Below is the procedure for what needs to be completed. Remember, with any lab activity, complete sentences are needed! Collaborate and good luck!

A Timeline in Prospective

Imagine stretching a ribbon from goal line to goal line down the center of an American football field, a distance of 100 yards (about 92 meters). Imagine that one end of the ribbon represents today and the other end represents the beginning of the universe – the Big Bang. Your ribbon represents 13.8 billion years, the entire history of the universe.

Imagine beginning at the goal line labeled BIG BANG and replaying the entire history of the universe as you walk along your ribbon toward the goal line labeled TODAY. Observations tell astronomers that the Big Bang filled the entire universe with hot, glowing gas, but as the gas cooled and dimmed, the universe went dark. That all happened along the first half-inch of the ribbon. There was no light for the next 400 million years, until gravity was able to pull some of the gas together to form the first stars. That seems like a lot of years, but if you stick a little flag beside the ribbon to mark the birth of the first stars it would not quite be 3 yards from the starting goal line where the universe's history began.

You have to walk only about 5 yards along the ribbon before galaxies formed in large numbers. Our home galaxy would be one of those taking shape. By the time you cross the 50-yard line, the universe is full of galaxies, but the Sun and Earth have not formed yet. You need to walk past the 50-yard line all the way to the 35-yard line before you can finally stick a flag beside the ribbon to mark the formation of the Sun and planets – our solar system- 4.6 billion years ago, about 9.2 billion years after the big bang.

You can carry your flags a few yards further to about the 26-yard line, 3.4 billion years ago, to mark the earliest firm evidence for life on Earth – microscopic creatures in the oceans – and you have to walk all the way to the 3-yard line before you can mark the emergence of life on land only 0.4 billion (400 million) years ago. Your dinosaur flag goes just inside the 2-yard line. Dinosaurs go extinct as you pass the one-half-yard line, 65 million years ago.

What about people? You can put a little flag for the first humanlike creatures only about an inch – 4 million – from the goal line labeled TODAY. Civilization, the building of cities, began about 10,000 years ago, so you have to try to fit that flag in only .0026 inch from the goal line. That's half the thickness of a sheet of paper! Compare the history of human civilization with the history of the universe. Every war you have ever heard of, every person whose name is recorded, every structure ever built from Stonehenge to the building you are in right now fits into that .0026 inch of the time ribbon.

Humanity is very new to the universe. Our civilization on Earth has existed for only a flicker of an eye-blink in the history of the universe. As you will discover while studying astronomy, only in the last hundred years or so have astronomers begun to understand where we are in space and time.

Procedure:

1. Begin by collaborating with your group to determine roles each of you will take in order for the challenge to be completed. There is a math component, signs, and spacing that all must be completed correctly. Proof read with your group, highlighting key procedural instructions prior to beginning.
2. Below is a table with universal life events. Using your group and the reading attached, map out how far along those events took place in relation to a football field and its yardage.

Universal Event	Yards <i>Start at goal line and progress from line 1 to 100</i>	Years Ago	Show Your Work!
Big bang (beginning)			
Universe went dark			
Birth of the first 5 stars			
First galaxies formed			
Universe is full of galaxies (minus our sun)			
Formation of the sun and planets (our solar system)			
Earliest evidence of life on Earth			
Emergence of life on land			
Dinosaurs roamed Earth			
1 st human-like creatures (according to the text)			
Today!			

3. Begin by creating a sign, using the paper and markers provided, that specifies each event, how many years ago it was, and on what yard line the event would take place. Be sure to write with bold letters so that they can be seen from afar and that all group members' names are on the back of each one.
4. When permission is granted, head outside to the field or lot specified and map out 100 yards. Using any measurement tools you feel are necessary (out of the ones provided), map out each your event signs and double check accuracy with group members.

5. The first group to signal that they are complete with all events accurately calculated and placed within the 100 yards will win a choice of a homework extension pass for 1 assignment or 2 bonus points towards the first test. Good luck!

Analysis:

Remember to answer each analysis question in complete sentences!

1. How long of a time period was there between the formation of our solar system and the big bang?
2. What happened right after the big bang that caused it to be dark for so long? Explain.
3. When we study the universe, what distance measurements would be the most accurate out of the ones we have discussed in class? Why? Explain.
4. Why do you think it's important for scientists to examine space at a universal level, even though our solar system is only one of many within our own galaxy, let alone tons of galaxies? (There is no one right answer, but put some thought into this – A.K.A. two sentences won't cut it.)