Name _____ #_____

"Origins: Back to the Beginning" Worksheet

This video covers the origins of the universe and how the scientific theories have developed. Answer the following questions while watching the video. The questions do go in chronological order to the video. Some answers to questions will be very close to each other in the video and some will be further away. The final section is for you to answer after the video is finished. The responses do not have to be in complete sentences.

1. One of the last versions of the theory that our cosmos has always existed and was unchanging is called the _____ theory.

2. The real Telstar satellite was built by _____, the phone company.

3. Telephones work by converting sound waves into _____ and back into sound waves at the other end of the line.

4. What makes one color different from the next? _____

5. Can we see infrared light? Can we sense it? How?

6. What two types of waves do we use to communicate through our atmosphere and through space itself? _____ and _____

7. The theory that the entire universe burst into being in a single instant is called the _____.

8. The Big Bang created a flash of light across the cosmos that can still be observed as a faint glow from what type of light wavelengths? _____

9. Most of the static from a television comes from _____ but 1% comes from _____ from the Big Bang.

10. What was the problem with the smooth, microwave glow observed from the Big Bang when compared to our current universe?

11. What was the name of the satellite that observed the microwave "hiss" of the Big Bang at hundreds of thousands of points in the sky and found a non-uniform "picture" of matter in the early universe? _____

12. What was the weakness of the data from the COBE satellite picture?

13. At the Cosmic Background Imager's high altitude of almost 17,000 feet, how many nights minimum does it take to get a usable detailed microwave of a tiny patch of sky? _____

14. The first picture to come back from the Cosmic Background Imager showed detail _____ times smaller than the COBE picture.

15. The Big Bang itself remains shrouded in mystery, although WMAP tells us that the universe's birthday took place _____ billion years ago. Using WMAP data, we can reach back almost to that beginning, at a time when the universe was tiny, much smaller than a _____. We're not sure what happened next, but the current idea is that an event called _____ triggered a hyper-fast expansion, enlarging the universe a trillion, trillion, trillion fold. Then it stops suddenly, leaving a dense, hot violent universe.

16. The WMAP "baby" picture of the cosmos showed what the universe looked like _____ years after the Big Bang.

17. Recent supercomputing simulations show the infant universe filled with vast, billowing clouds of _____. Almost immediately, the clouds begin to condense, pulled together by their own _____. As they become more and more dense, they create the first _____.

18. All elements heavier than _____ and _____ are forged by stars.

19. Stars keep making heavier and heavier elements until _____ is created.

20. The narrator states: "Iron can't fuel the stellar furnace. And so when a star builds up too much iron, it _____."

21. When large stars die and blow up, a _____ is made, "cooking" all the rest of the _____ on the Periodic Table.

22. The Eagle Nebula contains just about the same mix of heavy elements that our _____ does: carbon, _____, and the rest. But the big question is whether life, or at least the conditions that could allow life to emerge, are widespread throughout the cosmos.

23. To discover what distant galaxies are made of, scientists use an instrument called a _____.

24. SANDRA FABER states: "Using _____ as our tool, we can tell you what _____ exist in that galaxy: oxygen, carbon, iron. And we can tell you whether the galaxy is rich in those elements."

25. If a galaxy has a similar mix of elements as the benchmark of our _____, it could potentially support the same living chemistry we find here.

26. Is our universe's environment hospitable for life? Does that prove that life exists anywhere else?

Answer after the video:

List two things you learned from the video.
1.

2.

List two things that still confuse you or you have further questions about from the video.
1.

2.

Name _____

"Origins: Back to the Beginning" Worksheet Answer Key

This video covers the origins of the universe and how the scientific theories have developed. Answer the following questions while watching the video. The questions do go in chronological order to the video. Some answers to questions will be very close to each other in the video and some will be further away. The final section is for you to answer after the video is finished. The responses do not have to be in complete sentences.

27. One of the last versions of the theory that our cosmos has always existed and was unchanging is called the **steady state** theory.

28. The real Telstar satellite was built by **AT&T**, the phone company.

29. Telephones work by converting sound waves into **electrical impulses** and back into sound waves at the other end of the line.

30. What makes one color different from the next? **its wavelength**

31. Can we see infrared light? Can we sense it? How? **no; yes; heat**

32. What two types of waves do we use to communicate through our atmosphere and through space itself? **Radio waves** and **Microwaves**

33. The theory that the entire universe burst into being in a single instant is called the **Big Bang Theory**.

34. The Big Bang created a flash of light across the cosmos that can still be observed as a faint glow from what type of light wavelengths? **Microwaves**

35. Most of the static from a television comes from **local radio waves** but 1% comes from **microwaves** from the Big Bang.

36. What was the problem with the smooth, microwave glow observed from the Big Bang when compared to our current universe? **Our current universe is not smooth. It involves clumps of stuff.**

37. What was the name of the satellite that observed the microwave "hiss" of the Big Bang at hundreds of thousands of points in the sky and found a non-uniform "picture" of matter in the early universe? **COBE**

38. What was the weakness of the data from the COBE satellite picture? **A limited fuzzy picture**

39. At the Cosmic Background Imager's high altitude of almost 17,000 feet, how many nights minimum does it take to get a usable detailed microwave of a tiny patch of sky? **50 nights**

40. The first picture to come back from the Cosmic Background Imager showed detail **100** times smaller than the COBE picture.
41. The Big Bang itself remains shrouded in mystery, although WMAP tells us that the universe's birthday took place **13.7** billion years ago. Using WMAP data, we can reach back almost to that beginning, at a time when the universe was tiny, much smaller than a **pearl**. We're not sure what happened next, but the current idea is that an event called **inflation** triggered a hyper-fast expansion, enlarging the universe a trillion, trillion, trillion fold. Then it stops suddenly, leaving a dense, hot violent universe.

42. The WMAP "baby" picture of the cosmos showed what the universe looked like **380,000** years after the Big Bang.

43. Recent supercomputing simulations show the infant universe filled with vast, billowing clouds of **hydrogen**. Almost immediately, the clouds begin to condense, pulled together by their own **gravity**. As they become more and more dense, they create the first **stars**.

44. All elements heavier than **hydrogen** and **helium** are forged by stars.

45. Stars keep making heavier and heavier elements until **iron** is created.

46. The narrator states: "Iron can't fuel the stellar furnace. And so when a star builds up too much iron, it **dies**."

47. When large stars die and blow up, a **supernova** is made, "cooking" all the rest of the **elements** on the Periodic Table.

48. The Eagle Nebula contains just about the same mix of heavy elements that our **sun** does: carbon, **nitrogen**, and the rest. But the big question is whether life, or at least the conditions that could allow life to emerge, are widespread throughout the cosmos.

49. To discover what distant galaxies are made of, scientists use an instrument called a **spectrograph**.

50. SANDRA FABER states: "Using **spectra** as our tool, we can tell you what **elements** exist in that galaxy: oxygen, carbon, iron. And we can tell you whether the galaxy is rich in those elements."

51. If a galaxy has a similar mix of elements as the benchmark of our **sun**, it could potentially support the same living chemistry we find here.

52. Is our universe's environment hospitable for life? Does that prove that life exists anywhere else? **Yes; No**

Answer after the video:

List two things you learned from the video.
1.

2.

List two things that still confuse you or you have further questions about from the video.
1.

2.