EARTH SCIENCE NAME_____

DATE _____

Naked Science: "Birth of the Universe" Video Worksheet - Fill in the blanks as you watch the video. BEWARE – some of these answers will go by quickly! Work in groups of 2-3 to get them all.

- Everything we see around us is made of _____1_____: _____2_____, and _____3_____.
- Each and every atom that makes up the car were _____4_____ by our growing _____5_____.
- Physicist Lawrence Krauss: "We really are part star dust and part Big Bang dust. Most of the atoms in our body are from the _____6_____ of _____7_____, but some of them have been around since the earliest moments of the _____8_____. "
- Each and every atom was created over _____9_____ of years as our universe evolved.
- In the beginning, there was _____10_____.
- According to Krauss, everything that now exists in our universe was once contained in a region smaller than a _____11_____.
- The idea that our universe was once tiny originated with American astronomer _____12_____.
- In the 1920s, most astronomers believed that everything visible in the night sky were ____13____ that were all part of our own _____14_____, the Milky Way.
- Hubble showed that other galaxies were speeding _____15_____ from ours, and the further they were, the _____16_____ they seemed to be moving.
- The universe was _____17_____; and if the universe was expanding, then at some point in the past, it must have been _____18_____.
- Physicist David Spergel: "The Big Bang theory is not really a theory about how the universe began; it's really a theory of how the universe _____19_____."
- When the universe was a billionth of a billionth of a billionth of a billionth of a minute old, it was about

the size of a _____20_____.

- As the universe expanded, it _____21_____.
- A trillionth of a second after the big bang, our newborn universe was still expanding. But it didn't contain matter – it was pure _____22_____.
- In the baby universe, pure energy was converted into particles of _____23_____.
- The universe is now one millionth of a second old, and has expanded to ____24___ times the size of the solar system. The universe was now relatively ___25_____.
- Over the next three minutes, the universe cools enough for protons and neutrons to bind together and form the first atomic nuclei: _____26_____ and___ _____27_____. But they were not yet proper atoms – they were missing a vital ingredient – the _____28_____, which were moving too fast to form bonds with the nuclei.
- 380,000 years after the Big Bang, the universe had expanded to the size of the _____29_____. It had cooled from billions of degrees Fahrenheit to a few _____30_____. As it cooled, the electrons slowed down, and the universe was now ready to make its first true _____31_____.
- Over the next millions of years, the young universe continued to expand and cool. So far, the universe had only made _____32_____ and _____33_____ atoms. But the world we live in is made from more than ___34__ different kinds of elements. The universe needed to get hydrogen and helium atoms to ____35____. And to do that, it needed to make _____36_____.
- Tiny imperfections in the fledgling universe would become _____37_____ and _____38_____.
- Over millions of years, hydrogen atoms clumped together and _____39_____. The atoms began fusing and releasing _____40_____. The gas clouds started to burn brightly. Eventually, a _____41____ was born.

- Early stars acted like giant thermonuclear reactors, creating new _____42_____.
- Fusion reactions inside these stars released enormous amounts of energy and heat, which forced atoms to fuse to form new, heavier elements. Three helium nuclei combine to form _____43_____; two carbon nuclei fuse to form _____44_____; magnesium to form _____45_____; and so on over a period of hundreds of thousands of years, until silicon fused to form _____46_____.
- Iron is a very special atom. Even the extreme temperature inside stars cannot get iron to ___47____ into heavier elements.
- To create the heavier elements like chromium and zinc and gold and platinum, the universe conjured up massive exploding stars called _____48_____.
- When the giant stars that made the lighter elements ran out of _____49____, they collapsed in on themselves, creating incredible amounts of energy and enormous explosions. Supernova explosions were so powerful, they could fuse elements even heavier than iron, and _____50_____ the element production line.
- Without exploding stars, life itself _____51_____.
- Everything we can see on our planet was either made in the _____52_____ or inside a _____53____.
- The universe we live in is nearly _____54_____ years old.
- One theory of the end of the universe suggests that our universe will “run out of steam” and start to _____55_____, ending in a single super-dense pinpoint known as the _____56_____.
- However, analysis of Type 1A supernovae suggests that the universe is actually _____57_____ in its expansion, meaning that the universe will not collapse.

- Quite the opposite, it will continue to expand faster and faster. Our universe is literally ____58_____ _____59_____.

- The most likely future is perhaps the most dismal one, where the universe becomes ___60____ and ___61____

  and ____62_____. Space will become _____63_____ and _____64_____.