Name:_____

Date: _____

Chemistry

"The Race for Absolute Zero" WS

Answer the following questions about the video, "The Race for Absolute Zero". If necessary, refer to the transcript online at: http://www.pbs.org/wgbh/nova/transcripts/3501_zero.html

1. What modern conveniences exist because of 'cold'?

2. What is the coldest place on Earth? How cold can it get there?

3. Who was James Dewar? What did he invent?

4. Why were oxygen, nitrogen and hydrogen called "permanent gases"?

5. How basic process did Onnes and Dewar use in their attempts to liquefy hydrogen?

6. Why is the process of liquefying gases so dangerous?

7. After successfully liquefying hydrogen, why wasn't Dewar's accomplishment celebrated?

8. Why did Dewar give up on trying to liquefy helium? What eventually happened to Onnes?

9. With respect to scientific competition, what is meant by the statement, "the goalposts move as you're playing the game"?

10. What new word was developed for the phenomenon when all resistance to the flow of electricity stops at very, very cold temperatures?

11. What new state of matter was proposed by Einstein to explain the strange superfluid properties of helium at two degrees above absolute zero?

12. What elemental gas did Kleppner and Greytak decide to use in their attempt to make a Bose-Einstein condensate?

13. When Kleppner and Greytak failed, what two techniques did physicists from MIT use to try to cool the atoms?

14. Instead of using small gases, what alkali metal was selected as a good candidate for making a Bose-Einstein condensate?

15. How does evaporation cool hot matter, such as coffee?

16. On June 5th, 1995, what important historical event did the Boulder group achieve? What prize did they win as a result of this discovery?

17. What possible use for condensates was tested by Danish scientist Lene Hau?

18. What advantages does quantum computing have over traditional computing?

19. Why does it seem unlikely that we'll ever reach absolute zero?