Lab 12 NOVA film "Runaway Universe"

1. A 23-foot mirror reflecting telescope is being installed in an observatory on top of Mt. Hopkins to hunt down evidence of a mysterious _____ lurking in outer space.

2. One hundred years ago astronomers believed the universe consisted of only the _____ Galaxy and that the universe was static.

3. Albert Einstein reasoned that if the universe was static there must be some sort of antigravity force to balance the contractive forces of gravity. He called this antigravity force the _____.

4. In 1917 Mr. _____ first discovered nebulae that lie beyond the Milky Way Galaxy.

5. These nebulae turned out to be other _____ that were moving away from us.

6. In 1929 it was determined that the universe was not static, it was getting (bigger/smaller) everyday.

7. The _____ blast generated so much momentum that it has driven the expansion of the universe for 15 billion years. Over the eons _____ has worked against that outward thrust.

8. Scientists theorize that gravity should cause the expansion to (speed-up/slow down)

9. The hunters are looking for a special type of supernova, a Type _____ supernovae (also called white dwarf supernovae) that could be used as a cosmic speedometer because its brightness is so consistent.

10. Bob Kirshner finds it exciting to watch supernovae because they change relatively (quickly/slowly). Most astronomical things don't change in a human lifetime.

11. The team in Chile identified 35 supernovae that would be scrutinized later on at the Keck Observatory on the Island of _____.

12. It takes between 20 minutes to _____ to gather enough light from the supernovae because they are so faint.

13. The telescope breaks up _____ from the supernovae into its entire spectrum.

14. This type of supernovae has a very specific mixture of _____ revealed as a clear signature in the spectrum.

15. The best way to measure the speed of distant objects as they move through the cosmos is to look at the objects _____.

16. Alex and Adam whittled the field of supernovae contestants down to two candidates to be viewed by _____ telescope.

17. The astronomers wanted to confirm that the expansion of the universe was (slowing down/speeding up) but the data showed the expansion of the universe was (slowing down/speeding up).

18. The repulsive force counteracting gravity may prove that Einstein's cosmological constant is (true/false).

19. One of the names given to this repulsive force is _____ and it appears to come from nothing.

20. Astronomers theorize that empty space is not so empty. There are tiny subatomic particles that pop in and out of existence causing space to (stretch/shrink).

21. Dark energy is located everywhere in space and its properties are (very different/just like) normal matter.

22. Dark energy is not the first mysterious force discovered in the universe. There is a strange type of matter that causes our galaxy to orbit at speeds much (faster/slower) than predicted.

23. This strange type of matter is called _____, it does not emit or reflect light.

24. Astronomers from the University of California confirmed the presence of dark energy by using a telescope mounted on a balloon that takes snap shots of _____ background radiation from 300,000 years after the big bang.

25. Information from the telescope on the balloon revealed there is more dark energy out there than detected before. A pie chart of the composition of the universe would be ____ percent ordinary matter, _____ dark matter and ____ dark energy.

26. It appears that _____ may be the dominant force in the universe.

27. The universe will accelerate faster and faster. Billions of years from now an observer on Earth would only see stars in the Milky Way Galaxy and the _____ Galaxy.