

Cosmos: A Spacetime Odyssey – Episode 8

SISTERS OF THE SUN**“Nothing lasts forever... Even the stars die”**

1. What is one consequence of having all of our electric lights? _____

2. Humans were not the fastest or strongest of the animals we competed against, but we did have one thing going for us: _____

One aspect of that is our genius for _____ recognition.

Every human culture connected the dots to form their own pictures. These pictures, on a deeper level, became a _____.

3. A particularly bright group of stars known to us and the Ancient Greeks are called:

The _____

- Each of them is _____ times brighter than our Sun.
- The brightest one is _____ times brighter than our Sun.
- They've been used as a/n _____ test all over the world.
 - If you could see _____ of them, you were considered “normal”.
- They are related to a Celtic holiday now known as _____.
- Are connected to a mythical origin story of Devil's Tower.

4. In 1901, Harvard was a man's world. Edward Charles Pickering broke that rule. His “computers” mapped and _____ the types of stars.

Annie Jump Cannon was the leader of the team. She provided us with the key to the understanding of the _____ of the stars. **How did she lose her hearing?**

Henrietta Swan Leavitt discovered the law astronomers still use, more than a century later, to measure:

5. The _____ from a star is allowed to fall through a prism placed in the telescope. When magnified, the starlight is split up into a band showing its component _____. This is the _____ of the star.

This shows the presence of fine, dark lines. By comparing them with lines given, by glowing substances in the lab, we can determine that the same _____ familiar to us on the Earth also exist in the outermost star.

As per Cannon's method for organizing stars, how many major categories of stars exist? _____

6. English astronomer Cecilia Payne had to emigrate to _____ in order to study astronomy. Her discoveries allowed her to challenge one of the central beliefs of astronomy.

The resulting impact would be the dawn of modern astrophysics.

7. Payne began to analyze Cannon's data to see if she could determine the actual _____ composition and _____ state of the stars.

The most prominent features in the spectra of stars showed the presence of heavy elements such as _____ and _____, which are among the most abundant elements in the Earth.

8. What did Henry Norris Russell *think* he discovered about the Earth and Sun?

9. After listening to Russell's lecture, what conclusions did Payne arrive at about Cannon's data?

There are 1 _____ more times hydrogen and helium than the metals in the stars.

10. After Russell dismissed Payne's conclusions on the composition stars, she:
- A. stood her ground and pushed ahead without his approval.
 - B. amended her conclusions, suggesting there was a chance for error.
 - C. abandoned the pursuit of academics and moved to Downton Abbey.

11. Did Payne's conclusions end up being correct? Yes No

12. Which stars are considered "newborns"? _____

13. How old are most of the stars in the Big Dipper? _____

14. The stars of the Pleiades are in the process of moving _____ from one another, never to meet again.

15. Our Sun is _____ aged and a long way from where it was born.

16. The super hot _____ in the Sun's core pushes the Sun to expand _____ while its own _____ pulls it inward to contract.

The 2 forces of gravity and nuclear fire are in _____. A balance it will maintain for another 4 _____ years.

17. At present, the Sun fuses hydrogen. In a future phase, it will fuse _____.

18. The Sun will eventually devour: _____

The Sun's final state will be as a white _____.

19. The fate of a blue giant like Rigel is:

The huge star, Anilam, will collapse to become a: _____.

20. The aboriginal people of the Australian outback saw patterns in the: _____.

21. Eta Carinae pours out _____ million more times as much light as our own Sun.

It will eventually die in a _____.

22. All the atoms that make up our world were made of _____.

23. Will Orion eventually reach the Pleiades? Yes No

Why? _____

24. From a planet orbiting a star in a distant globular cluster, a still more glorious dawn awaits: not a sunrise, but a _____.

...the rising of the _____.

Extension: Why do we rarely hear about the great scientists introduced in this episode?

Who is Neil deGrasse Tyson?