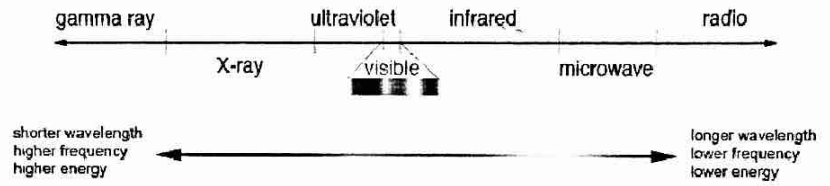


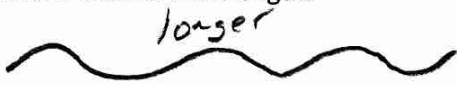
Name: Key

1. What is the general name that includes gamma rays, x-rays, ultraviolet, visible light, infrared, microwaves, and radio waves?

Electromagnetic Radiation



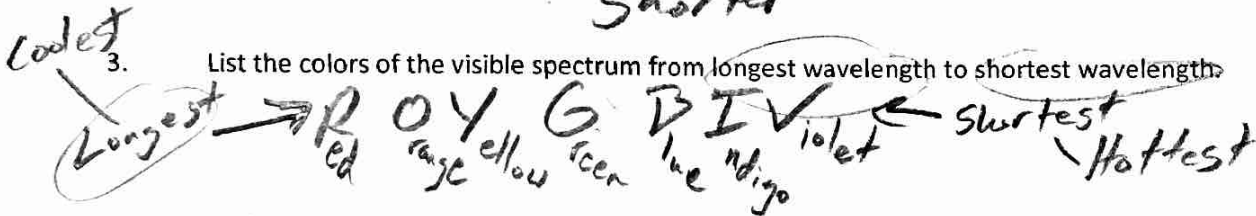
2. a. Draw and label two waves, one with a longer wavelength, and one with a shorter wavelength.



- b. Which waves have more energy, those with short wavelengths or those with long wavelengths?

Shorter

3. List the colors of the visible spectrum from longest wavelength to shortest wavelength.

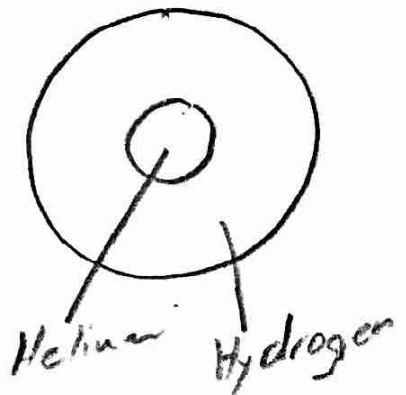


4. Rank these star colors from hottest to coolest. Orange, Red, Yellow, Blue, White

Blue white yellow orange red

5. Stars get their energy from a process called nuclear fusion. Most of the time, during this process, the element hydrogen gets squeezed together to turn into the element helium.

6. Draw a picture showing where these two elements (from the previous question) are located in the sun.



7. What is the heaviest element that can be created inside a star?

Iron

8. Right now, our sun is a main sequence star. What is a main sequence star?

A star that is fusing hydrogen into helium (mostly)

[A middle aged star]

9. In the next stage of our sun's life (about 5 billion years from now), its size will increase (increase or decrease) and its surface temperature will decrease (increase or decrease). In this new stage, it will be called a red giant. After that, the sun's size will decrease (increase or decrease) and its surface temperature will increase (increase or decrease). At that point it will be called a white dwarf.

giant

cooler (red)

dwarf

Hotter (star's white)

10. The early universe was about 75% hydrogen and 25% helium. Where did the rest of the elements come from?

a. Where did the lighter elements come from (up to the mass of iron)?

Nuclear fusion in stars

b. Where did the heavier elements (heavier than iron) originate?

Supernovas

"One solar mass" is the mass of our sun

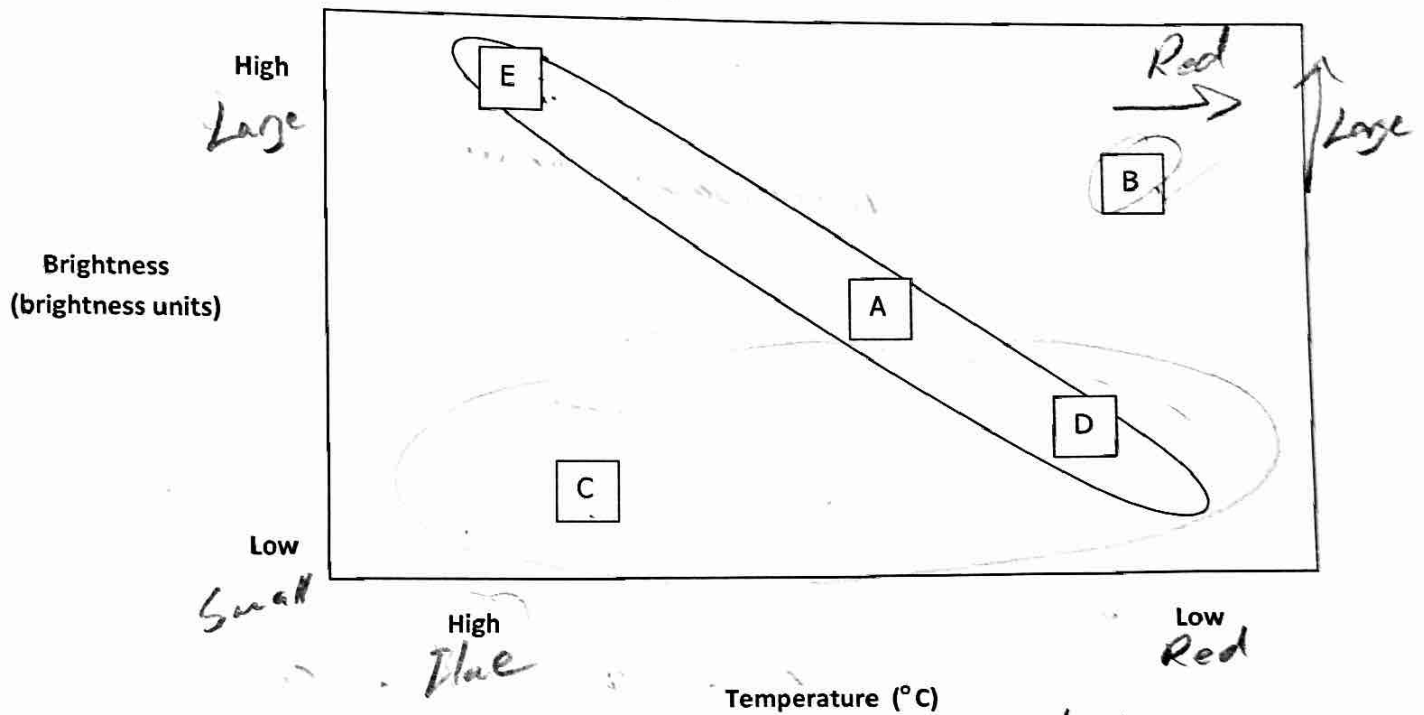
In order for a star to die as a supernova, the star's mass needs to be at least 8-12 solar masses.

13. After a supernova, the material left over from a very large star can have three different fates. One fate is that it can turn into a neutron star. What are two other possible fates of a star after a supernova explosion?

1) Black Hole

2) Material is blasted into space to be recycled into a new nebula (like ours)

Use the Hertzsprung-Russel diagram (H-R diagram) below to answer the following questions. Mark the correct letter as indicated on the chart. The boxes represent stars



14. What is the name of this type of diagram? *H-R Diagram*

*Hertzsprung-Russel Diagram*

15. Which of the lettered stars are *main sequence* stars? *E, A, D*

16. Which star is the brightest? *E*

17. Which star would be considered a red giant? *B*

18. What star is most likely to be a white dwarf? *C*

19. Which star has the hottest surface temperature? *E*

20. Which letter could represent the present day Sun? *A*

21. Which star is most likely to be blue? *E*

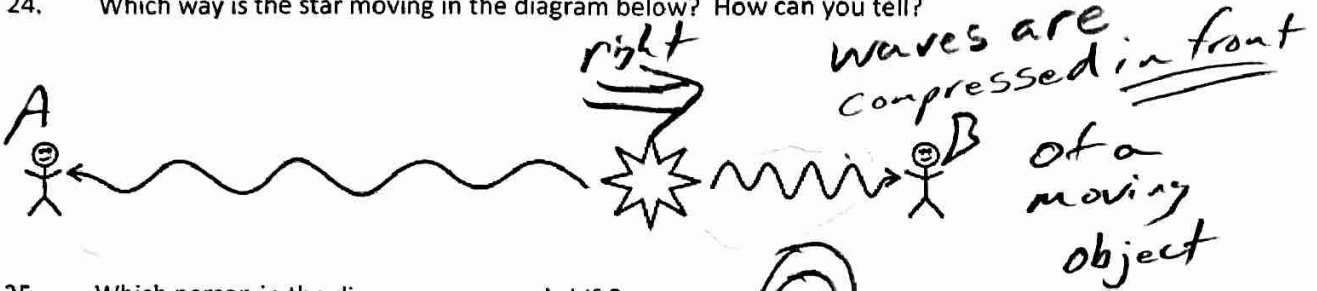
22. What is the Big Bang? *Beginning of the Universe; rapid growth*

23. How old is the Universe?

*13.8 Billion Years*

*Explosion*

24. Which way is the star moving in the diagram below? How can you tell?



25. Which person in the diagram sees a red shift?

A (longer waves)



26. One piece of evidence for the Big Bang is that all other galaxies have *red shifts*. Explain how this provides evidence for the Big Bang.

Red shifts mean galaxies are moving away from us, which means space is growing (like a big explosion)

27. Briefly describe one more piece of evidence suggesting that the Big Bang occurred.

Heat left over from the Big Bang (in the form of Microwave Radiation, called the CMBR)