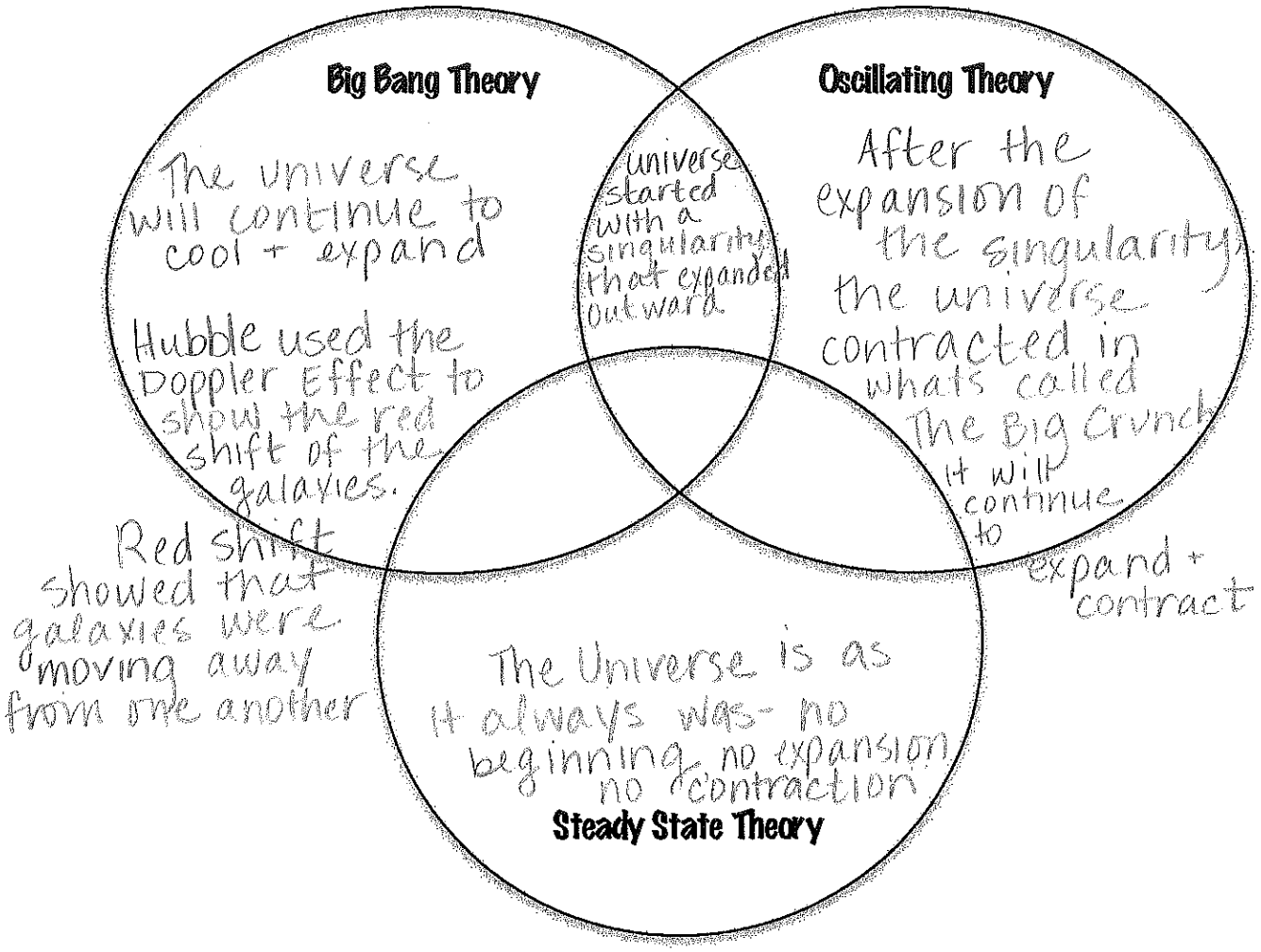
Name:
Class/Period:

Answer Key

Universe Study Guide

1. Complete the Venn Diagram below.



2. Explain the Heliocentric model of the Solar System.

Sun was at the center of the Solar System and all celestial objects in the SS orbited it

3. What scientists supported this model, and who was the scientist that first theorized the Heliocentric Model? Copernicus (in the 1400's) was the first scientist to support this model. Galileo, Kepler, + Newton all supported his theory with scientific findings

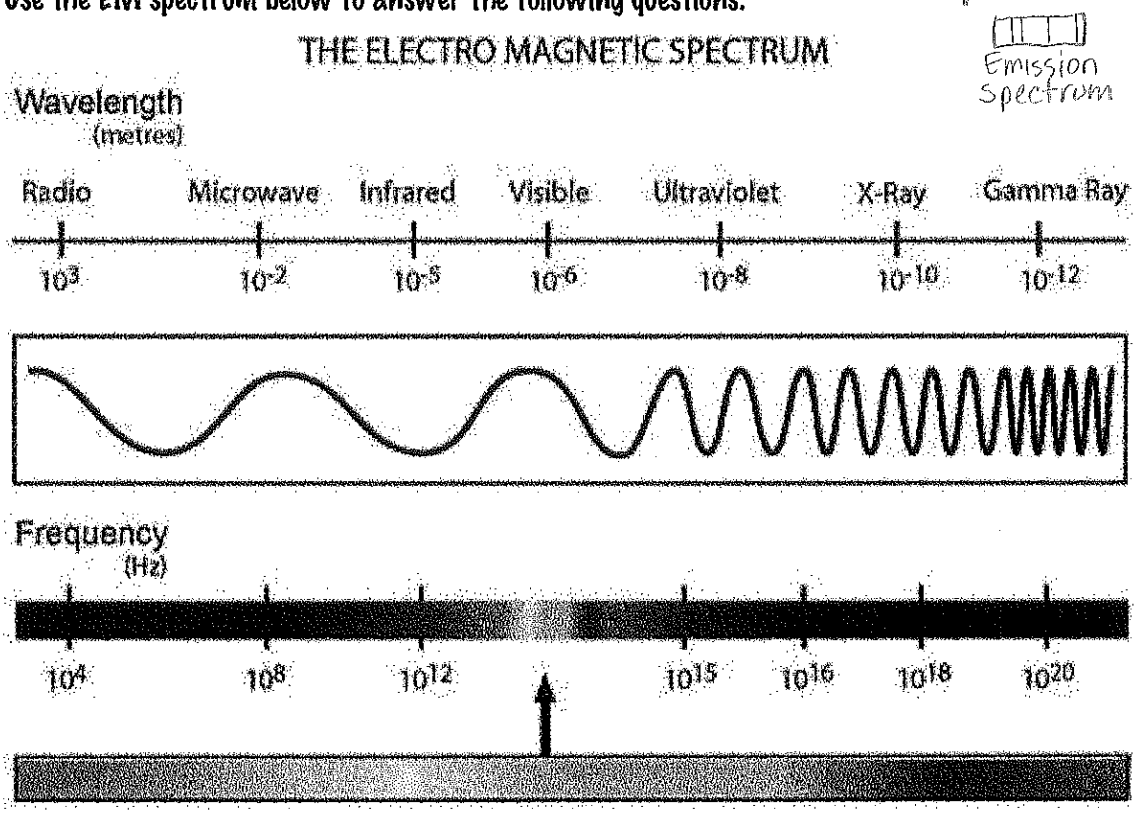
4. Put the following components of the universe in order from smallest to largest.

Star	**Universe**	**Star Cluster**
Solar System	**Galaxy Cluster**	**Galaxy**

star-solarsystem-star cluster-Galaxy-Galaxy Cluster-Universe

5. How do scientists use the emission and absorption spectra from stars? Stars emit certain wavelengths of light. We can pick these up in what's called an emission spectrum. Each element has a different absorption spectrum that we can use to see if the emission spectrum matches up to it

Use the EM spectrum below to answer the following questions.



Emission Spectrum

Absorption Spectrum

In this way, we can tell what elements are in that star

6. What type of wave has a long wavelength? Radiowaves

7. What type of wave has a shortest wavelength? Gamma Rays

8. What type of wave has the highest frequency? Gamma Rays

9. What type of wave has the ~~shortest~~ lowest frequency? Radiowaves

10. What type of wave has the highest amount of energy? Gamma Rays

11. What type of wave has the lowest amount of energy? Radiowaves

12. What are the 7 types of waves in order?

Radiowaves, Microwaves, Infrared, Visible, Ultraviolet, Xray - Gamma Ray →

13. What do all electromagnetic waves have in common?

they all travel at the same speed in a vacuum

14. Define light-year.

The distance that light travels in 1 year

15. About how many kilometers is in 1 light-year? (Do NOT use exponential form.)

9.5 Trillion

16. If the light from our Sun left right at this moment, in what year would it reach Betelgeuse? (Betelgeuse is 640 light-years away.)

It would take 640 years.

2016
+ 640 years
2656

year 2656

17. Use the information you found in question 6 to answer this question. How many kilometers away is Proxima Centauri if it is 4.3 light-years from Earth?

1 ly = 9.5 trillion Km

4.3 ly = 40.85 trillion Km

$$\begin{array}{r} 9.5 \\ \times 4.3 \\ \hline 285 \\ 3800 \\ \hline 40.85 \end{array}$$

18. How do scientists classify galaxies?

by shape

19. Name the 3 types of galaxies and describe their characteristics including the amount of gas and dust, age of stars, unique qualities, and shape.

Elliptical - flattened ball shaped galaxy / they do not vary in shape
- Very little gas + dust
- Old stars

Spiral - Arms extending from the center - Can vary in shape
- Lots of dust + gas
- Young + middle aged stars

Irregular - no pattern to shape - Can vary in shape
- Lots of dust + gas
- Young stars

20. What type of galaxy do we live in?

Spiral

21. Explain what a blue shift or red shift indicates. Why does it indicate this?

When objects move, the person observing the object sees a "shift" in the wavelengths it gives off. When the object is moving towards the observer, the wavelengths are shortened, and so they appear blue. When the object is moving away from the observer, the wavelengths are stretched, and so they appear red.

22. Think back to our galaxy stations. We made a model of our galaxy using sand. List some limitations of this model.

size / distance
color

23. How are stars classified? by size, temperature, brightness

24. What is the size, color, and temperature of our Sun compared to other stars?

Medium-sized, yellow-white, medium temp.

25. What process has to happen in order for a star to be "born"?

Nuclear Fusion- the gas + dust inside the nebula are pulled together by gravity. When it gets hot enough Hydrogen will start to fuse together into Helium, releasing immense amounts of light + heat

(H) + (H) → (He)

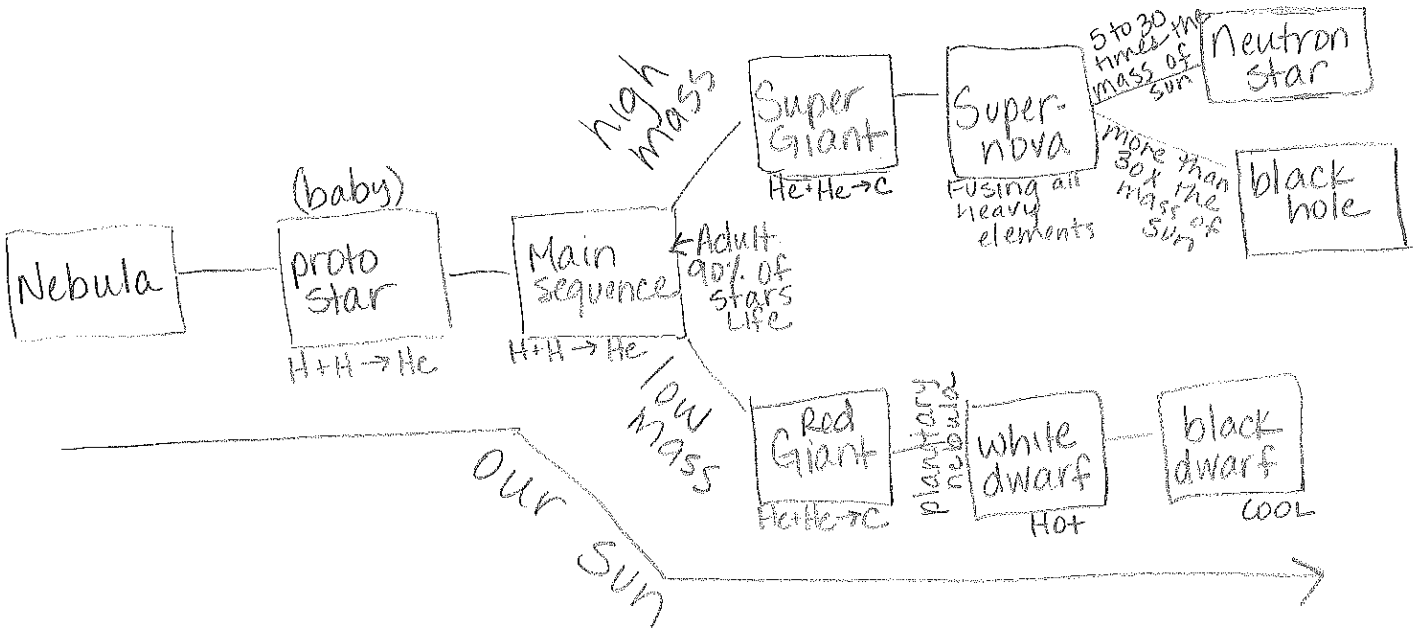
26. Describe the difference between absolute magnitude and apparent magnitude and give an example of when they would be very different.

Absolute magnitude is the brightness of a star based on temperature.
Apparent magitude is the brightness of a star as seen from Earth.
The Sun's absolute magnitude is average, but it's apparent magnitude is very high because it is so close to us.

27. What does mass tell us about a star's lifetime?

More mass = shorter life
Less mass = longer life

28. Draw out the lifecycle of low/medium mass stars, and high mass stars.



REVIEW

29. What 2 elements must be present in order for a compound to be organic?

Hydrogen, + Carbon

Use the chemical formula for sugar $C_6H_{12}O_6$ to answer the following questions.

30. How many carbon atoms would be in 3 molecules of sugar?

18 atoms of C

31. How many hydrogen atoms would be in 3 molecules of sugar?

36 atoms of H

32. How many oxygen atoms would be in 3 molecules of sugar?

18 atoms of O

33. You have a block of copper that has a mass of 55 grams, and has the following dimensions- 4cm X 5cm X 4cm. What is the density of the block?

$D = \frac{m}{V}$ $V = l \times w \times h$ $4 \times 5 \times 4 = 80cm^3$ $\frac{55 grams}{80cm^3} =$

$D = .69\ g/cm^3$

80 | 55.00 → .687 (480 → 200 → 160 → 400 → 400 → 0)

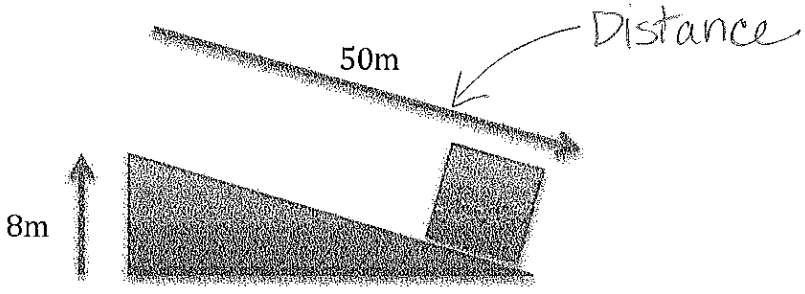
34. You have a cube with a side length of 3cm. You measure the mass to be 57grams. What is the density of the cube?

$D = \frac{m}{V}$ $V = l \times w \times h$ $= 3 \times 3 \times 3 = 27cm^3$ $\frac{57 grams}{27cm^3} =$

27 | 57.0 → 2.1 (54 → 30 → 27 → 3)

$D = 2.1\ g/cm^3$

Use the diagram to answer the following question.

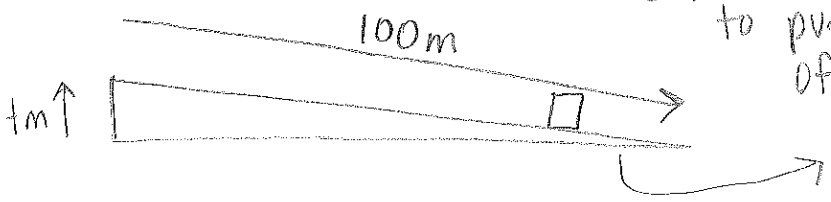


35. If it takes 50N of force to move the box up the ramp, how much work have you done? $W = f \times d$

50N × 50m = 2500 Joules

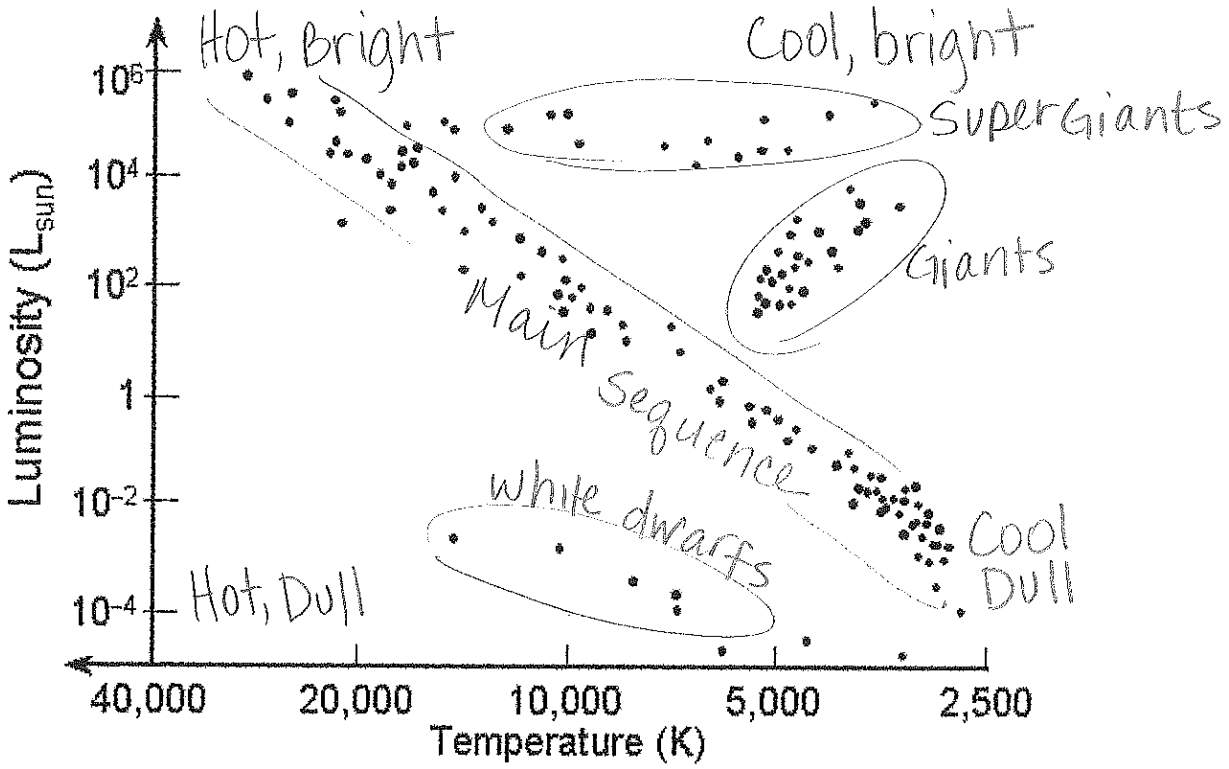
36. Can you lessen the amount of work you would need to do by making the ramp longer? Explain why or why not.

This would reduce the force required to push the box, but NOT the amount of work.



25N × 100m = 2500 Joules

HR Diagram- Use the diagram below to answer the following questions.



1. **Label the graph with the following characteristics.**
   - **Hot, Bright**
   - **Hot, Dull**
   - **Cool, Bright**
   - **Cool, Dull**

2. **Label the graph with the following-**
   - **Main Sequence**
   - **White Dwarfs**
   - **Giants**
   - **Super Giants**

3. **What trend do you see for the main sequence stars?** As the brightness increases, temperature

4. **Where is our Sun located on this graph?** Main sequence - in the middle

5. **Where will our Sun be located on this graph in the next stage of its life?** Giants

6. **Which stars are the hottest?** Blue

7. **Which stars are the coldest?** Red

8. **Can a star start at the top of main sequence and travel down through main sequence during its lifetime?** NO. This graph does not tell you the next stage in a star's life. It only tells you what stage the star is in now. A large main sequence star that's blue would never turn into a small redstar