

The Zodiac, Constellations, and Star Characteristics
Earth Science/Geology Mr. Traeger

Name: _____ Period: _____ Date: _____

Purpose

The purpose of this activity is to become familiar with the zodiac and other prominent constellation star groups. Students will also become familiar with basic star characteristics of stars.

Materials

▪ 1 ½ manila folders	▪ scissors	▪ glue
▪ star finder cutout sheet	▪ star wheel cutout sheet	▪ star handouts
▪ textbook	▪	▪

Part 1: The Zodiac

1. Observe the Starry Night Program and the demonstration that is done in class. What determines the sign of the zodiac for a particular time period?

2. What is the difference between astronomy and astrology? Which one is a science and which one is not?

Part 2: Star Finder (Planisphere) Construction

1. You should obtain 1 ½ manila folders, scissors, a star-finder holder cutout sheet, a star wheel cutout sheet, and glue.
2. Glue the holder cutout pattern on to the front of a manila file folder, with the east-south edge of the holder along the fold of the file folder.
3. Cut out the outside of the star finder holder and the center oval (one side only!). Staple the front and back together.
4. Glue the star wheel to one side of the manila folder. Cut out the wheel.
5. Place the wheel inside of the holder. Rotate it to make sure that it rotates freely. Align the date with the time of night to find the stars that will be visible.

Part 3: Star Finder Questions (Use the simple star field to answer these)

1. Assume that you will go outside tonight to observe the stars. What constellations will be completely visible at 9:00 PM?

2. Which constellations were visible at 9:00, but are no longer visible at 11:00?

3. Why did the constellations disappear?

4. Which horizon are disappearing constellations closest to?

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5. Turn the dial until it is set for 5:00 AM. Which constellations are still visible that were also visible at 9:00 PM?
6. Why do some of the constellations ~~set,~~ while others seem to stay in the sky?
7. Rotate your dial one complete circle. In what part of the sky (north, east, south, or west) do you find constellations that never seem to set?
8. What are the names of the constellations that never seem to set?
9. Find a star that never seems to move. What constellation is it in?
10. What constellations will be visible at 9:00 PM six months from now (on October 14)?
11. Why are the constellations six months from now going to be different? What is Earth doing?
12. Could you use this star finder in the southern hemisphere (Australia)? Why or why not?
13. Bonus: What is the **name** of the star that never seems to set? How could you use this star to ~~find~~ yourself in the Northern Hemisphere?

Part 4: Star Characteristics (Use the Star Data Sheets to answer these)

1. **Label** the 10 stars in the Star Data Sheet on the complex star field side of your Star Finder.
2. What is apparent magnitude?
3. What is a light year?
4. How many years did it take light to get to Earth from the star Pollux?
5. **Geology**: How far away (in kilometers) is one light year if the speed of light is 300,000,000 meters per second?

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6. Describe parallax. Stick a pencil out in front of you and open and close your left and right eye. Describe what you see. What happened to the parallax angle the farther away you moved the pencil?

7. Geology: Calculate the distance in parsecs and light years for the following stars. Distance in parsecs = $1/\text{parallax angle}$. There are 3.26 light years in every parsec.

Star Name	Parallax angle (arcsecs)	Distance in parsecs	Distance in light years
Alpha Centauri	0.732		
Alpha Canis Majoris	0.379		
Alpha Aquiliae	0.194		
Alpha Canis Minoris	0.286		

8. What is the mass of a star measured in?

9. What is the size (radius) of a star measured in?

10. What is the temperature of a star measured in?

11. How does the temperature of a star affect its color?

12. What is luminosity? What does it depend on?

13. What is absolute magnitude? What does it depend on?

14. How does apparent magnitude compare to absolute magnitude?

Homework for tonight! Go outside tonight after dark with your star finder and some binoculars if you have them. A small flashlight (preferably with a red filter) is also needed. Make sure to hold the star finder over your head and point the North arrow in the direction of the mountains. **On a separate piece of paper**, do the following: A) List the names of the constellations/star groups you can identify. B) What was the time and location where you observed? (Note: do this on the next night that it is clear if it is cloudy tonight.) C) What are some of the brightest stars in the sky and where are they? Just say the location in the sky if you do not know the name. D) Find a star that appears red. Where is it? E) Find a star that appears yellow. Where is it? F) Find a star that appears blue. Where is it? G) What does the color of a star tell you about that star? H) Are the brightest stars burning the hottest? Why or Why not? I) How can you tell the difference between the planets (Venus, Jupiter and Saturn) and the stars?

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Part 5: Rating 10 Stars

1. Using the star information sheets, rate the stars from lowest to highest in each category.

Apparent Magnitude	Distance in light years	Mass (Solar masses)	Size (Solar diameters)	Temperature (Kelvin)	Luminosity (compared to sun)	Absolute Magnitude

2. Are all stars the same? Why or why not?