

▣ Making a Hertzsprung-Russell Diagram ▣

A Hertzsprung-Russell diagram, or H-R diagram, is made by plotting on a graph the color and absolute magnitude of stars. The color tells us the temperature of each star's surface. The absolute magnitude tells us the luminosity, or true brightness, of each star: **the larger the absolute magnitude, the smaller the luminosity**. The most luminous stars have absolute magnitudes that are negative numbers.

The table below gives the color and absolute magnitude for a number of stars. On the H-R diagram below, make a point for each star. Include a key that designates which star is which dot (ex: color code them, letters, numbers...) Then, answer the questions on the back of this sheet.

Star	Color	Absolute Magnitude
Sun	Yellow-white	5
Sirius	Blue-white	1
Epsilon Eridani	Orange	6
Rigel	Blue	-7
Betelgeuse	Red	-6
Barnard's Star	Red	13
Capella	Yellow-white	-1
Deneb	Blue-white	-7
Spica	Blue	-3
Aldebaran	Orange	-1



Use the introduction and your notes to answer the following questions:

1. Label the y axis with which end is the "most luminous" and which is the "least luminous".

2. Which stars are main sequence stars? _____

3. Which stars are giant stars? _____

4. On your star reading guide, the H-R diagram plots absolute magnitude and temperature. On this assignment, the H-R diagram plots absolute magnitude and color. Both graphs look very similar. What is the relationship between color and temperature? In other words, which colors represent hot temperatures, which colors represent cold temperatures? Include an example in your answer.

5. Based on your reading guide on stars, place a large square where white dwarfs would be found on the H-R diagram.

6. Which of the following stars is most likely to become a supernova? (circle one):

Betelgeuse Sun Spica Capella

7. Read the H-R diagram and list the characteristics of the Sun (be specific):

H-R DIAGRAM WORKSHEET

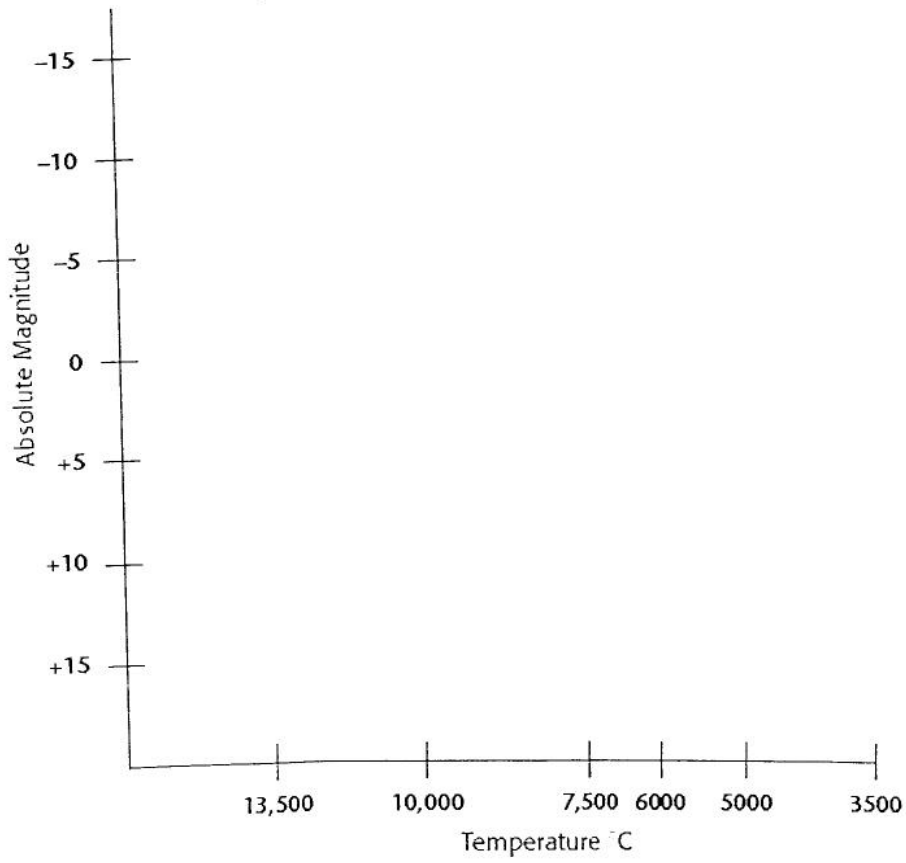
Complete this worksheet after you finish reading Chapter 19, Section 2.

An H-R diagram shows the relationship between a star's surface temperature and its absolute magnitude. Follow the instructions below to create your own H-R diagram on the next page. You may want to use colored pencils or crayons for this activity. Remember that a star's brightness increases as you move toward the top of the H-R diagram.

1. Our sun is an average star. It should be located at about the center of the diagram. Draw and label the sun on the diagram.
2. Draw and label a red-dwarf star on the diagram. Red-dwarf stars are dim and have a low temperature.
3. Draw and label a white-dwarf star on your diagram. White-dwarf stars are dim and have a high temperature.
4. Draw and label a blue star on the diagram. Blue stars are very hot and bright.
5. Draw and label a red giant on the diagram. Red giants are cool and bright.
6. Most stars can be plotted along the main sequence of an H-R diagram. These stars range from very bright, very hot stars to dim, cool stars. Indicate and label on your diagram where the main sequence should go.
7. Which of the stars that you have plotted are included in the main sequence?

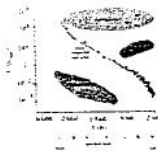
8. Imagine that you have discovered a new star in the night sky. Your measurements show that it has a surface temperature of $10,000^{\circ}\text{C}$ and an absolute magnitude of $+10$. Based on your diagram, what type of star do you think it is?

Diagramming the Stars, continued



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Worksheet: H-R Diagram



Name	_____
Date	_____
Period	_____ Table _____

Use the diagram to the right to answer the following:

Most stars belong to this category:

_____ 1.

Which star is the brightest white dwarf?

_____ 2.

Which star is hottest supergiant?

_____ 3.

What color is Deneb?

_____ 4.

What temperature is Sirius B?

_____ 5.

_____ 6. This star is a red **Giant**.

_____ 7. What temperature is Bernard's Star?

_____ 8. Which star is the dimmest (least bright) on the chart?

_____ 9. What category is the hottest star on the chart?

_____ 10. What color are the coolest stars?

_____ 11. What category of stars is hot but not very luminous?

_____ 12. If you know a star's color, you can determine its _____.

_____ 13a. The H-R Diagram is based on what two criteria?

_____ 13b.

Looking at the Main Sequence category, state a relationship between these two criteria:

14. _____

The Hertzsprung-Russell Diagram

