

Title: Constellations

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Subject(s): Science, Mathematics, Language Arts

Topic(s): Constellations, Stars, Star magnitude, Astronomy, Space Science

Grade/Level: 3-6

Summary of Lesson: Students will practice making models of constellations that show the magnitudes of different stars in that constellation using a Lite Brite toy.

Objectives:

By the end of this activity, students will be able to:

- Identify various constellations.
- Build constellation models showing magnitudes of the stars.
- Define the word magnitude.

Time Allotment: 30 minutes

Procedures/Instructions:

Background: When finding a certain constellation in the night sky, you will usually look for the brightest stars first. Stars have grades according to their brightness called magnitudes.

Bright to Very Bright	1 st magnitude
Fairly Bright	2 nd magnitude
Medium	3 rd magnitude
Faint	4 th magnitude
Very Faint	5 th magnitude

Note: Students may confuse color with brightness of stars. Betelgeuse is red and bright (but also very big). Rigel is white and bright. Size, distance, and color all contribute to a star's magnitude.

Preparation:

1. Make a constellation model on black construction paper for the students to use as an example. The model should fit Lite Brite. For younger students, you should draw the constellations on cards ahead of time with symbols for



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- the stars using the key below. The students will find the right color for the symbol and put the peg in themselves. The older students can use a constellation guide (such as Rey's) and make their own cards.
2. Get a copy of Find the Constellations by H. A. Rey. This is an excellent reference for the team to use as they build their own models.

Student Instructions:

1. Your team will look at the sample constellation and use the key to determine the magnitude of the stars in that constellation.
2. Now your team will select a constellation from the resource book at the station and create a card for use with the Lite Brite of a different constellation using the chart symbols to indicate magnitude.
3. Label the card with the name of the constellation.
4. Put the card into the Lite Brite and use the colored pegs that stand for the different magnitudes.
5. Take the pegs out and try a different constellation if time permits.
6. Leave the new card(s) in the card file for future use by other teams.

Extensions:

Discuss the difference between color and magnitude using the [Student Handout](#)

Check out the Virtual Star Explorer and navigate through the stars exploring their magnitude, luminosity and distance using navigational coordinate systems.
http://www.kidsastronomy.com/virtual_explorer/

Instructional Materials:

- Lite Brite toy with pegs
- Set of constellation model sheets (see [Sample](#))
- Various pictures of constellations, i.e. in the book, Find the Constellations by H. Rey or another constellation book
- [Magnitude chart](#)

National Science or Mathematics Standards:

Science

Science as Inquiry

CONTENT STANDARD A:

As a result of activities in grades K-4 and 5-8, all students should develop Understandings about scientific inquiry

Physical Science

CONTENT STANDARD B:

As a result of activities in grades K-4, all students should develop an understanding of

- Position and motion of objects

As a result of activities in grades 5-8, all students should develop an understanding of

- Motions and forces

Life Science

CONTENT STANDARD C:

As a result of activities in grades K-4, all students should develop understanding of

- Organisms and their environments
 - Humans depend on their natural and constructed environments.

Earth and Space Science

CONTENT STANDARD D:

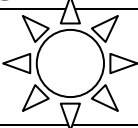





As a result of activities in grades K-4, all students should develop an understanding of

- Objects in the sky
- Changes in the Earth and sky
 - Objects in the sky have patterns of movement.

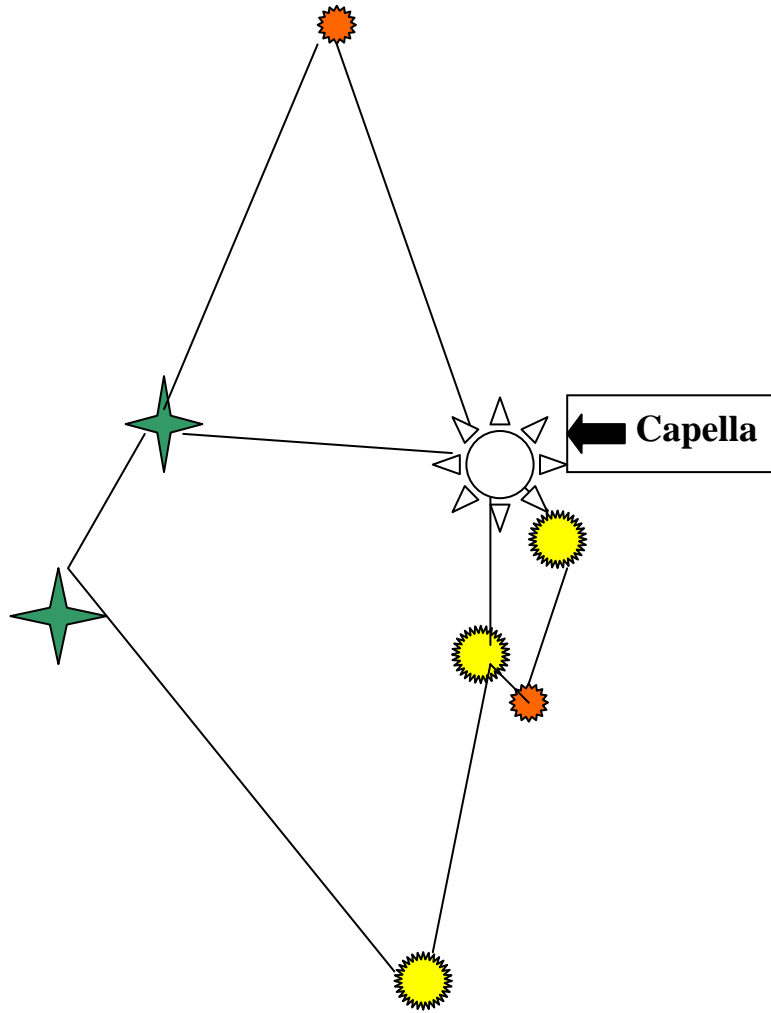
Assessment Plan:

Students can be assessed on their completed cards (older) or their completed Lite Brite models (younger).

STAR MAGNITUDE CHART

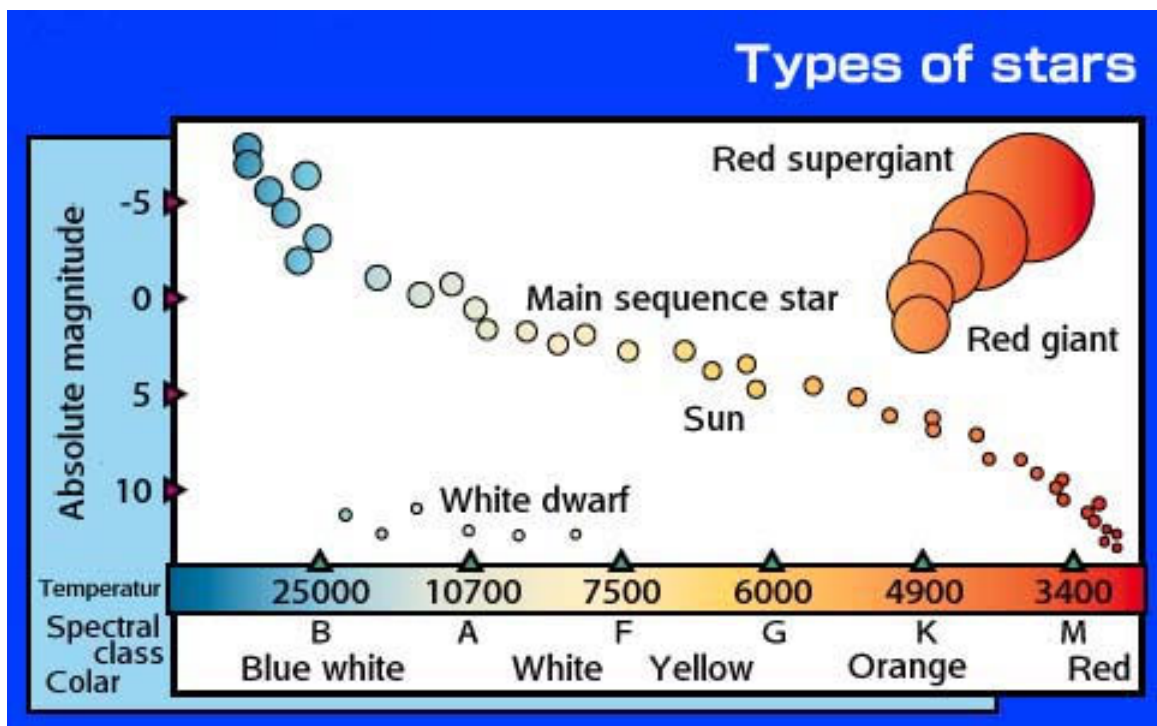
DESCRIPTION	SYMBOL	COLOR PEG
Very Bright		White
Bright		Blue
Fairly Bright		Green
Medium		Yellow
Faint		Orange
Very Faint		Red

SAMPLE CONSTELLATION



Types of Stars

A star's brightness is indicated by its "magnitude." The brightness of stars that are visible from Earth is expressed in units called magnitude. The stars that appear brightest to the naked eye are called "stars of the first magnitude," while stars that can barely be seen are called "stars of the sixth magnitude." The difference in brightness between each level of magnitude is about 2.5 times. Many stars have a more precise rating with a decimal point, such as magnitude 1.5, etc. Stars brighter than magnitude 1 are classed as magnitude 0, or -1, etc. However, as each star is a different distance from the Earth, "absolute magnitude", which expresses the "apparent magnitude" of a star at a fixed distance from the Earth (32.6 light years) is used to express its actual brightness.



Stars with the hottest surface temperatures appear white, while cooler stars appear red. Antares, which is a first magnitude star in the constellation of Scorpio, appears red, while Sirius, which is a first magnitude star in the constellation of Canis Major, appears bluish white. The reason that stars have different colors is the difference in their surface temperatures. Stars with a fairly low surface temperature of around 3,000 degrees Celsius appear red. A star with a surface temperature of around 6,000 degrees Celsius will appear yellow, and even hotter stars will be white. Stars with a surface temperature of 20,000 degrees Celsius or more shine with a bluish white light. Stars so faint that their color cannot be clearly distinguished from Earth can nevertheless be viewed through a

prism, and their light examined by means of spectral analysis. In this way, we can discover the dominant color of the star, and estimate its surface temperature.