Directions

Adapted from **"Sizes of Stars"**
from *Stars and Planets* by Dr. Mary Urquhart (University of Texas at Dallas)

Activity

1. Introduce the scale factor of 1:10 billion for this model. One good way to talk about scale factors with your students is to discuss maps. Have students name other types of scale models they have seen before, such as model cars, model rockets, globes, etc. In the scale model for this activity, 1 centimeter on this scale equals 10 billion centimeters.

2. Using the Sun as an example, explain how to convert the real diameter (140 billion cm) to the scaled diameter (14 cm). Have metric rulers available for students and ask: what real-life objects might be 14 cm in diameter? Show students the grapefruit/yellow ball that represents the sun.

3. Give student groups their **Star Classes Table.** As a group, have them calculate the scaled size of the other six classes of stars and come up with ideas for model object column. Once the groups have filled out their worksheets, show students the objects you found to represent the different classes of stars. (You will most likely not have anything large enough for the O class – students will have to use their imaginations to visualize something the size of a Smart car). Have students discuss which objects should represent which types of stars. Students can use their rulers to measure the objects (measurements may not match the scaled sizes exactly – keep in mind that the main sequence stars in each spectral class can be a range of sizes).

4. Ask students: "If the Sun is the size of a grapefruit in our model, what size would the Earth be?" (.13 cm or 1.3 millimeters in diameter, which is about the size of a candy sprinkle!)

5. Discuss why the Sun seems so big and bright to us compared with other stars in the sky? (This gets students thinking about stellar distances.)

End your activity to keep things simple and only introduce stellar scale.

Or continue with an introduction of Stellar classes.

One following page you will find an introductory explanation to Stellar classes.

Why do stars come in different types (or classes)?

Looking at photos of stars taken with a powerful telescope like Hubble, we notice that stars appear in different colors. Stars give off light of different colors based on their temperature and the elements in their atmosphere. Luminosity is a measure of how much energy (or light) an astronomical object gives off. The luminosity of a star depends on its size and temperature. Stars spend most of their “lives” generating energy by fusing hydrogen into helium in their cores. The rate of fusion depends on the pressure in a star’s core. More massive stars can “squeeze” their cores harder so they will fuse faster and get hotter than stars lower in mass, because they are producing more energy. Generally, the color of a star is linked to its surface temperature. The hotter the star, the shorter the wavelength of light it will emit. The hottest stars (class O) appear blue or blue-white, which are shorter wavelengths of light. They are also the most massive. Cooler stars appear red or red-brown, which are longer wavelengths. (Stars don't emit their light in one wavelength only. A range of light is emitted; the wavelengths of light from a star "peak" in one color on a bell-shaped curve.) The Hertzsprung–Russell diagram (below) plots luminosity versus temperature and shows Star Classes.