SCIENTIFIC CASE:

Study of Hertzsprung-Russell Diagram[1]

Team members

Writer: _____

Equipment manager: _____

Reader: _____

Spokesperson: _____

Ambassador: _____

Context

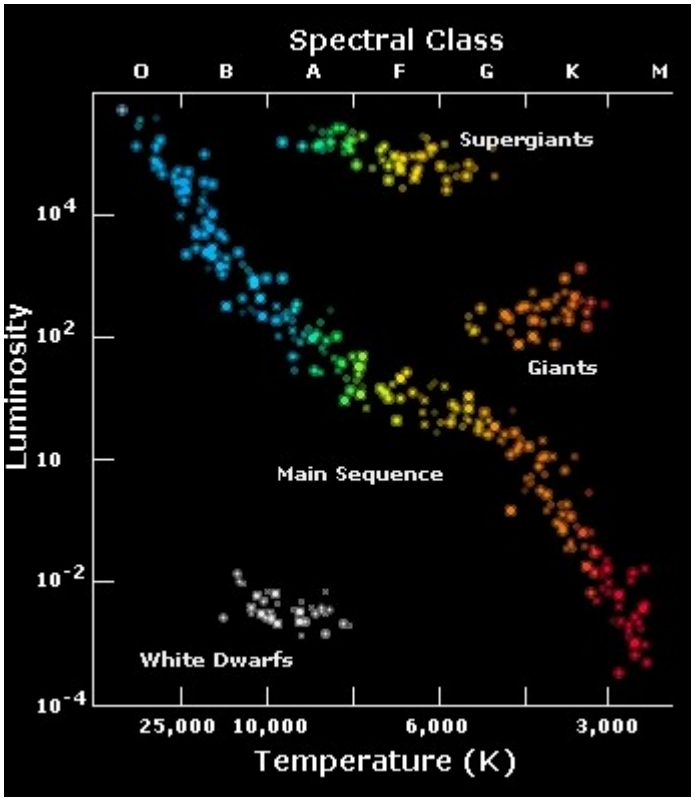
An open star cluster is a group of stars which were originally formed from the same initial gas cloud (mostly hydrogen). These clusters can be made up of dozens or hundreds of stars.

Open star clusters are excellent astronomical laboratories. The stars that form one are all equally as far from us, they move in the same direction, they are approximately the same age, and they have about the same chemical composition. Thus, **when we see differences between the brightness of different stars in the same cluster, we know that it can only be because they have different masses**. Studying several clusters, we can compare them and know more about stellar evolution, clusters' ages, and much more.

1 Designed by Planeta Ciencias, in collaboration with the CESAR team.

*The **Pleiades.** NASA, ESA, AURA/Caltech, Palomar Observatory.*
Source: http://hubblesite.org/newscenter/archive/releases/2004/20/image/a/Author

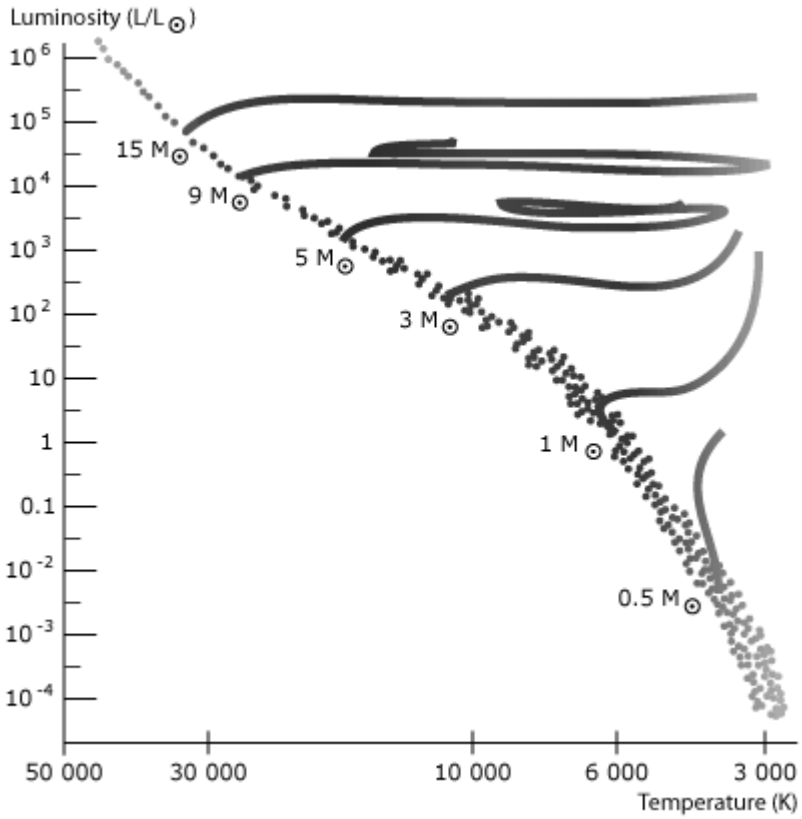
This and other research have allowed us to find out the different types of stars that exist and how most of them evolve. Take a minute to understand the following plot.



Hertzsprung-Russell Diagram. Credit: ESA.
http://sci.esa.int/education/35774-stellar-radiation-stellar-types/?fbodylongid=1703

Nearly all stars are in one of the places shown on the graph. For instance, there are no blue stars with luminosity 10. But there are, in fact, stars with luminosity 10^4 . Also, as you can see, most of them are in the **Main Sequence**.

Each star has an age, and because they can live thousands of millions os years, we can only known how they evolve by observing relationships between different stars. In the following plot, you can see how some of them change over time. That is, we took some stars (dots) and we traced a line that describes how their temperature changes over time.



HR Diagram showing paths of stars with different masses. Credit: ESA.
http://sci.esa.int/jump.cfm?oid=36828

More educational resources:

Hertzsprung-Russell Diagram: http://sci.esa.int/jump.cfm?oid=35774

CESAR: http://www.cosmos.esa.int/web/cesar
ESA education: http://sci.esa.int/education/

Scientific case: Study of Hertzsprung-Russell Diagram

We are going to study the evolution of an arbitrary star: the Sun.

Research equipment:

You have access to these:

- Colour pencils, paper, rubber.
- Sellotape/glue stick. Scissors.
- H-R Diagram poster.
- Cutouts with information about different stars.

Procedure

1. Each group will be given coutouts with incomplete information about some celestial objects (all of them are, have been, or will be, similar to the Sun).

Name of the celestial object	
Image (credit: ESA, NASA. Hubble Space Telescope)	

Description

Age (years)	
Radius (compared to the Sun's)	
Temperature (compared to the Sun's)	
Brightness (compared to the Sun's)	

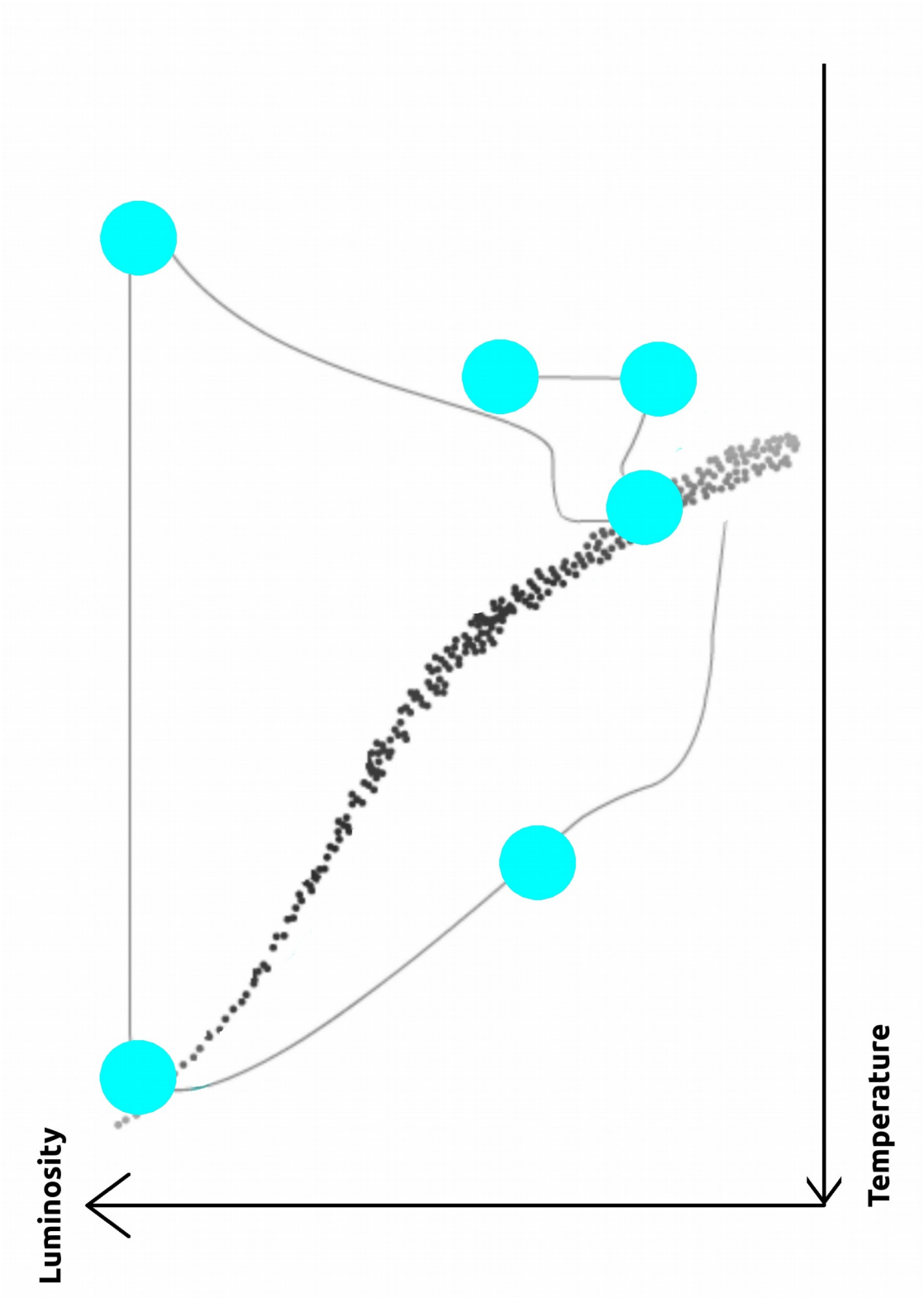
2. Each cutout corresponds to a place on the H-R Diagram poster, which will be hung on the wall. As you can see, this diagram traces a line that describes the Sun's evolution from its birth to its death.

3. The aim of each group is to glue the cutouts they have on the correct spot of the diagram.

4. Observing where other groups place the cutouts is vital in order to share information.

5. If you have any doubts, ask the educators or other groups. Never hesitate to ask questions and share your work with others!

If you need extra information or if you are interested in learning more, you can use this Interactive Hertzsprung-Russell Diagram.



POSTER H-R diagram Sun Evolution