

# RAFT IDEAS

**Topics:** Astronomy, Local Stars, Scale & Structure of Milky Way Galaxy

## Materials List

- ✓ Pony beads (mini)
- ✓ Bamboo skewers
- ✓ Styrofoam, ~3 cm x 30 cm x 30 cm (1" x 12" x 12")
- ✓ 1 cm graph paper, at least 24 cm x 24 cm
- ✓ Hot glue

This activity can be used to teach:

- Stars in the Milky Way Galaxy (CA Science Standards: Grade 8, 4.a & 4.b; HS Earth Sciences, 2.a & 2.b)
- Astronomical measurement (light years) (CA Science Standards: Grade 8, 4.c)



# The Closest Stars

It's a Beautiful Day in Our Stellar Neighborhood

Students create a 3-dimensional representation of the closest stars in this activity that demonstrates the scale and structure of space and our Milky Way galaxy.

## To Do and Notice

1. Attach a sheet of 1 cm graph paper to the Styrofoam. (Scale: 1cm = 1 light year)
2. Label a point in the center of the graph (0,0) and number the X and Y-axes.
3. Using the data table below, graph the X and Y coordinates of each star. Label each point with the star name.
4. Insert a bamboo skewer into the Styrofoam sheet at each labeled point.
5. Glue a mini pony bead onto the bamboo skewer at the "Z" coordinate, as determined by the table data. The completed model should have the Sun at the center. Use the "Z-Adjusted" column for measurements from the Styrofoam base.
6. Represent binary stars with 2 beads glued together (e.g. -61 Cygni).

Star	X	Y	Z	Z (Adjusted)
Sun	0.0	0.0	0.0	+12.0
Proxima Centauri	-1.6	-1.2	-3.7	8.3
Alpha Centauri (binary)	-1.7	-1.4	-3.8	8.2
Barnard's Star	-0.1	-6.0	+0.5	12.5
Wolf 359 (CN Leo)	-7.4	+2.1	+0.9	12.9
Lalande 21185	-6.4	+1.6	+4.8	16.8
Alpha Sirius	-1.6	+8.2	-2.5	9.5
Beta Sirius	-1.6	+8.2	-2.4	9.6
Luyten 726-8 (binary)	+7.8	+3.6	-2.8	9.2
Ross 154	+1.9	-8.5	-3.8	8.2
Ross 248	+7.4	-0.6	+7.2	19.2
Epsilon Eridani	+6.3	+8.5	-1.8	10.2
Luyten 789-6	+9.8	-3.7	-2.9	9.1
Ross 128	-10.9	+0.6	+0.2	12.2
61 Cygni (binary)	+6.4	-6.0	+7.0	19.0
Epsilon Indi	+5.5	-3.1	-9.5	2.5
Procyon (binary)	-4.8	+10.3	+1.0	13.0
Sigma 2398	+1.1	-5.9	+10.0	22.0

## The Science Behind the Activity

Our Sun is located on an outer arm of the spiral-shaped Milky Way galaxy, a cluster of well over 200 billion stars. At the scale of this model, the Milky Way would be 1km across and 30 meters thick (at our location). This model presents locations of the closest stars (within a 24 ly<sup>3</sup> "box"); however, most are quite dim, and humans can see only 6 with the unaided eye (Alpha Sirius = brightest). 17<sup>th</sup> century French mathematician Rene Descartes developed coordinate graphing as a means of identifying and analyzing locations. This activity also uses the vertical Z-axis.

## Taking it Further

Have students calculate the Milky Way's size at this scale.

**Web Resources** (Visit [www.raft.net/more](http://www.raft.net/more) for how-to videos and more ideas!)

- More model details - [www.essex1.com/people/speer/starmodel.html](http://www.essex1.com/people/speer/starmodel.html)