



Make Your Own Star Bracelet

A M.A.R.S. Craft Activity

Courtesy of the Museum Astronomical Resource Society, Tampa, Florida

Here is everything you need to make your own Star Bracelet, a neat way to learn about stars. Collect the different colored beads listed below. Cut an 8" piece of elastic bead cord or another type of string. Tie a knot in the end of the bead cord and put the beads on in the order listed below. When you are done, tie the ends together and proudly wear your own Star Bracelet!

Bead Color	Harvard Classification Letter	Description	Example Stars (or nebulae)
Clear		This bead reminds us of the clouds of frozen gases and dust in space, called nebulae. Gravity pulls the gas and dust together. When they are pressed together tightly enough, fusion begins in the center. When the heat grows out to the surface of the mass, the outside begins to glow. As star is born!	Orion Nebula (M42)
Light Blue	O	The hottest stars have surface temperatures of 50,000 K to 28,500 K. Because they are so hot, they shine bright blue.	Iota Orionis
Light Blue	B	The next hottest stars have surface a temperature of 28,500 K to 10,000 K. They also shine bright blue.	Rigel, Spica
White	A	The next hottest stars have a surface temperature of 10,000 K to 7,450 K. They shine white-hot.	Sirius, Vega, Deneb
Yellow	F	The next hottest stars have a surface temperature of 7,450 K to 6,050 K. They shine bright yellow.	Canopus, Procyon, Polaris
Yellow	G	The next hottest stars have a surface temperature of 6,050 K to 5,000 K. They also shine yellow, like a star we all know!	Sun, Capella
Orange	K	The next hottest stars have a surface temperature of 5,000 K to 3,500 K. They shine bright orange.	Arcturus, Aldebaran
Red	M	The next hottest stars have a surface temperature of 3,500 K to 2,500 K. They shine bright red. These are very cool stars. Much cooler than their bright blue-white cousins. Stars that are cooler than this type cannot be seen with eyes or optical telescopes. We must look for them by their heat, looking at their infrared radiation.	Betelgeuse, Antares
Metallic		When some stars grow old, they blow off their outer layers of gas, leaving a small core that shines out radio waves. We call these neutron stars, or pulsars (because they pulse radio waves as they quickly spin around.)	
Black		When some stars grow old, they collapse under their own mass, becoming very small while keeping all of their original gravity. The gravity is so strong that not even light can escape. These are commonly called black holes.	
Clear		In the end, the only thing left of a star is the gas and dust that it blows out. A nebula. If conditions are right, this gas and dusts combines with the gas and dust from other nearby stars and the process starts all over again!	

Each type of star is associated with a letter in the Harvard Classification system. One way to remember the letters, and their order, is by using the following sentence: "Oh be a fine girl/guy, kiss me."

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The Museum Astronomical Resource Society, also know as the M.A.R.S. Astronomy Club, is sponsored by the Museum of Science and Industry (MOSI), Tampa, Florida. You may e-mail the club at MARSastro@yahoo.com or visit the club web site at www.marsastro.org.



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Teaching Script

Courtesy of the
Museum Astronomical Resource Society, Tampa, Florida

The teacher directions are written in parentheses. Speaking portions are written in quotation marks.

"Here is everything you need to make your own Star Bracelet, a fun and fashionable way to learn about stars."

(pick up elastic cord) "First, pick up the elastic cord and tie a knot in one end, if there is not one already."

(pick up a clear bead) "Pick up one of the clear beads and thread it onto the cord. This bead reminds us of the clouds of frozen gases and dust in space, called nebulae. Gravity pulls the gas and dust together. When they are pressed together tightly enough, fusion begins in the center. When the heat grows out to the surface of the mass, the outside begins to glow. As star is born! One example is the Orion Nebula, Messier object number 42, or M42 for short."

"Here is a quiz: When it comes to stars, what do you think is the hottest color?" (listen and acknowledge the various answers)

"What do you think is the coolest color?" (listen to the various answers)

"Have you ever seen the flame of a candle or a match? What is the color of the flame that is farthest away?" (listen to answers)
"Reddish-orange. If you look carefully, you will see that the color changes as you move toward the center of the flame, from reddish-orange to orange, to yellow, to a whitish color, and then to a bright blue at the center. Is the center of the flame the hottest part or the coolest?" (listen to answers) "The hottest. What would be the coolest?" (listen to answers) "Red or reddish-orange."

(pick up the light blue bead) "Pick up one of the light blue beads and thread it onto the cord. This represents the hottest stars. They have surface temperatures of 50,000 K to 28,500 K. Because they are so hot, they shine bright blue. An example of this type of star is Iota Orionis."

(pick up the second light blue bead) "Pick up the other light blue bead and thread it onto the cord. This represents the next hottest stars. They have a surface temperature of 28,500 K to 10,000 K. Even though they are cooler, they also shine bright blue. Two examples of this type of star are Rigel and Spica."

(pick up the white bead) "Pick up the white bead and thread it onto the cord. This represents the next hottest stars. They have a surface temperature of 10,000 K to 7,450 K and they shine white-hot. Three examples of this type of star are Sirius, Vega and Deneb."

(pick up one of the yellow beads) "Pick up one of the yellow beads and thread it onto the cord. This represents the next hottest stars. They have a surface temperature of 7,450 K to 6,050 K. They shine bright yellow. Three examples of this type of star are Canopus, Procyon and Polaris."

(pick up the second yellow bead) "Pick up the other yellow bead and thread it onto the cord. This represents the next hottest stars. They have a surface temperature of 6,050 K to 5,000 K. They also shine yellow, like a star we all know! Can anyone guess what this star might be? (listen to answers) It is also yellow and it is very near to us. (listen to answers) The Sun. The Sun and another star, Capella, are two examples of this type of star."

(pick up the orange bead) "Pick up the orange bead and thread it onto the cord. This represents the next hottest stars. They have a surface temperature of 5,000 K to 3,500 K and they shine bright orange. Two examples of this type of star are Arcturus and Aldebaran."

(pick up the red bead) "Pick up the red bead and thread it onto the cord. This represents the next hottest stars. They have a surface temperature of 3,500 K to 2,500 K and they shine red. Two examples of this type of star are Betelgeuse and Antares. These are very

cool stars. Much cooler than their bright blue-white cousins. Stars that are cooler than this type cannot be seen with eyes or optical telescopes. We must look for them by their heat, looking at their infrared radiation."

"The next two beads tell us of two possible endings for stars."

(pick up the metallic bead) "Pick up the metallic bead and thread it onto the cord. When some stars grow old, they blow off their outer layers of gas, leaving a small core that shines out radio waves as the stars rotate very fast. Astronomers did not know about these stars until they became using radio telescopes in the 1960s. Because they appear to pulse out radio waves as they spin, they are sometimes called pulsars.

(pick up the black bead) "Pick up the black bead and thread it onto the cord. When some stars grow old, they collapse under their own mass, becoming very small while keeping all of their original gravity. The gravity is so strong that not even light can escape. Does anyone know what we call these collapsed stars?" (listen to answers) "Remember that the color of the bead we are using is black. Does that help you?" (listen to answers) These are commonly called black holes.

(pick up the second clear bead) "Pick up the second clear bead and thread it onto the cord. In the end, the only thing left of a star is the gas and dust that it blows out during its life. What do we call a cloud of gas and dust? (listen to answers) "A nebula. If conditions are right, this gas and dusts will combine with the gas and dust from other nearby stars and the process will start all over again, creating a new star!"

"Bring together the ends of your cord and tie a loop not to hold them together." (if needed, help tie the knots)

(Hold up a bracelet and review the hottest and coolest colors. Then review the two possible endings for a star—a pulsar or a black hole. Point out that a star begins from a nebula and that in the end, all that remains is a nebula to start the process again.)

(still holding the bracelet) "Each type of star is associated with a letter in the Harvard Classification system. The letters are, from hottest to coolest: O, B, A, F, G, K, M, with O being the hottest and M being the coolest. One way to remember the letters, and their order, is by using the following sentence: 'Oh be a fine girl/guy, kiss me.'"

"You are now ready to tell everyone that you meet about the different types of stars using your very own Star Bracelet!"

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