Lesson Title	Stars and Bucky Balls
Length of Lesson	1 day (50 minutes)
Created By	Hannah Box
Subject	Earth and Space Science
Grade Level	7^{th} -8^{th}
State Standards	Eighth Grade: 4f
DOK Level	DOK 2
DOK Application	Identify patterns, construct, modify
National Standards	5-8: A
Graduate Research Element	Organic chemists synthesized Bucky balls in a laboratory similar to the way that I make the organic compounds in my lab.

Student Learning Goal:

State Standards Eighth Grade:
(4f) Describe the hierarchical structure (stars, clusters, galaxies, galactic clusters) of The universe and examine the expanding universe to include its age and history and the modern techniques (e.g., radio, infrared, ultraviolet and X-ray astronomy) used to measure objects and distances in the universe. (DOK 2)

National Standards 5-8: A:
Science advances through legitimate skepticism. Asking questions and querying other scientists' explanations is part of scientific inquiry. Scientists evaluate the explanations proposed by other scientists by examining evidence, comparing evidence, identifying faulty reasoning, pointing out statements that go beyond the evidence, and suggesting alternative explanations for the same observations.

Materials Needed (supplies, hand-outs, resources):

PowerPoint, organic model kits, constructed Bucky ball, soccer ball

Lesson Performance Task/Assessment:

Students will be asked to make a Bucky ball using molecular model kits.

Lesson Relevance to Performance Task and Students:

Students will hear how difficult it is to synthesize this organic molecule and the complex structure it has. They when then have to construct one using organic model kits. They will be constructing a molecule that was discovered in outer space.

Anticipatory Set/Capture Interest:

Show students pictures taken by the Hubble space telescope found on NASA's webpage

Guided Practice:

The teacher will go through the PowerPoint covering the basics of stars. The students will learn what a star is, the different types, how to classify them, and about the lives of stars. Since the beginning of the space unit, the students have heard about the discovery of new planets, stars, and galaxies using new technologies. At the end of the PowerPoint, the teacher will introduce them to a different type of discovery that can be made using space technology. A Bucky Ball is a carbon cage structure similar to a soccer ball. Bucky Balls are compounds that were synthesized on Earth in 1985 and were then discovered in 2010. Make sure that you have an example structure. The teacher will then tell the students all of the different things that Bucky balls are believed to do. If time allows, explain that when carbon is present then compounds are considered organic. Go over the differences between organic and inorganic.

Finally the teacher will explain the basics of using an organic model kit. Tell the students that carbon can make four bonds to other elements and draw an example on the board (CH_4 methane gas).

Independent Practice:

The students will be asked to split into groups of 4-5. They will have to construct their own Bucky ball using their model kits (may be helpful to have soccer balls for them to look at)

Remediation and/or Enrichment:

Remediation:

Individual IEP. Do not require students to complete the Bucky ball, instead have them make smaller pieces.

Enrichment:

Students will have to preform internet searches to see what other types of organic molecules have been discovered in space. Have them write a report detailing the discovery in space and whether or not it has be made or found on earth.

Check(s) for Understanding:

Is our star special?

Do you think it will die in your lifetime? What will happen when it does die?

If you were trying to find a location to place a telescope, what would you look for?

Closure:

Students will have a better understanding of how molecules bind together and the types of discoveries that can be made in space.

Possible Alternate Subject Integrations:

Astronomy: New discoveries and technologies.
Chemistry: Important discoveries in the field.

Teacher Notes: