

# AEROSPACE MICRO-LESSON

*Easily digestible Aerospace Principles revealed for K-12 Students and Educators. These lessons will be sent on a bi-weekly basis and allow grade-level focused learning. - AIAA STEM K-12 Committee.*

## HANNY'S VOORWERP

“Hanny” is Hanny van Arkel, a Dutch elementary school teacher. “Voorwerp” is Dutch for “thing” or “object.” Thus “Hanny’s Voorwerp” could be properly rendered in English as “Hanny’s Object.” The original name, however, has stuck. It has its own web site: <http://www.hannysvoorwerp.com>. Apart from being interesting in its own right, it demonstrates that amateurs can still make significant discoveries in astronomy.

Next Generation Science Standards (NGSS):

- \* Discipline: Earth and Space Sciences.
- \* Crosscutting Concept: Structure and Function.
- \* Science & Engineering Practice: Analyzing and Interpreting Data.

### GRADES K-2

NGSS: Earth’s Place in the Universe: [Use observations of the sun, moon, and stars to describe patterns that can be predicted.](#)

Hanny van Arkel was participating in a Citizen Scientist project when she found the object now known as Hanny’s Voorwerp. What is a citizen scientist? Good question. [A citizen scientist is a person who voluntarily contributes his or her time, effort, and resources toward scientific research in collaboration with professional scientists or alone.](#) These individuals don’t necessarily have a formal science background. In other words, it is everyday people just like you and me, helping scientists. Hanny was working on a project called Galaxy Zoo in which people study images of galaxies and help to classify them according to their shapes. You can visit the [Galaxy Zoo website](#) and see some of these images for yourself. There are also other projects people can work on, some involve outer space and many in other fields like climate, biology, or nature. Check out possible projects on sites like [Zooniverse](#) and [SciStarter](#). Do you see one that your class or family might help with?

### **GRADES 3-5**

NGSS: Earth's Place in the Universe: [Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from the Earth.](#)

One group of scientists that has asked for help from citizens is NASA. The folks at NASA have accumulated far more images from space than they can ever sort through on their own. So they have asked for help from us—the everyday citizens who are interested in space and are willing to use some of their free time to look at these images and count, sort, or classify different objects. Visit [NASA's Citizen Scientists page](#) to see if one of the projects interests you. Perhaps one day there will be an object in space named after you, just as Hanny's Voorwerp is named after Hanny van Arkel.

### **GRADES 6-8**

NGSS: Earth's Place in the Universe: [Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.](#)

NGSS: Earth's Place in the Universe: [Analyze and interpret data to determine scale properties of objects in the solar system.](#)

Since [Ms. van Arkel spotted the voorwerp](#) on a Galaxy Zoo image, astronomers have tried to explain it. It is worth pointing out (post on August 13, 2007 at 12:12:35 PM by “zookeeperKevin”) that the first reaction in the discussion was that it might be a camera defect. Discoveries of new and strange things are quite rare; faulty equipment and [local interference](#) are much more common. After establishing that the object is real, astronomers set to the job of figuring out what it is and what could have caused it.

One possible explanation, [described in “Universe Today,”](#) is that a quasar shone very brightly in a nearby galaxy and that the voorwerp is shining by the quasar's light. The quasar has since quit shining so brightly, so we do not see it directly. One point in the explanation is that there may be parts of the voorwerp that we do not see because the light from the quasar was shaded by other objects in its galaxy. This is worth emphasizing: just because we don't see anything in a region does not mean that there is nothing there.

## **GRADES 9-12**

NGSS: Earth's Place in the Universe: [Construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe.](#)

Ms. van Arkel was taking part in a citizen science effort called the "[Galaxy Zoo](#)." The Galaxy Zoo started with a series of photographs of galaxies taken as part of the Sloan Digital Sky Survey and asked people to tell what kind of galaxy (elliptical, spiral, or merger) each one is. Newer versions of the Galaxy Zoo have added more sources of the photographs and have asked for other information. The [Galaxy Zoo](#) page has a section devoted to using it in the classroom, including a way for teachers to exchange lessons based on the galaxy surveys. Participating in the Galaxy Zoo effort is a way for your students to contribute to the knowledge of humanity.

Sixty Years Ago in the Space Race:

March 18, 1957: [Aviation Week reported that a United States Air Force evaluation team was barred from entering Redstone Arsenal in an attempt to prevent the Jupiter rocket program from being cancelled.](#)