ACTIVITY 3

MARSHMALLOW CONSTELLATION

Level:	Preparation:	Number of students:	Length:	Place:	Type of activity:
Grades 3-6	**intermediate**	**individual or groups of 2-3**	**20 min.**	**classroom**	**do-it-yourself**

BRIEF DESCRIPTION

The students build a three-dimensional model of Cassiopeia using spaghetti and marshmallows.

MATERIALS

- spaghetti (minimum 5 per team)
- small marshmallows (minimum 5 per team)
- scissors
- modelling clay
- 1 sheet of cardboard per team (use cardboard from cereal boxes, shoe boxes, or any other box)
- rulers
- 1 sheet of Cassiopeia constellation with chart (last page of activity) per group

OPTIONAL

- images of the Big Dipper and Cassiopeia (see Activity 1—Design a constellation)

PREAMBLE

When we look at the stars, it appears as if the points of light are all at a set distance from us. In fact, we sometimes speak of the "celestial sphere," as if all the stars were glued to a giant sphere above our heads. But the sky is actually three-dimensional, and there are enormous distances between the stars. This activity allows you to explore a constellation in three dimensions.

PREPARATION

It might be a good idea to do Activity 2 with the star finder before this one, to familiarize the students with the sky and constellations, especially Cassiopeia.

STEPS

INTRODUCTION

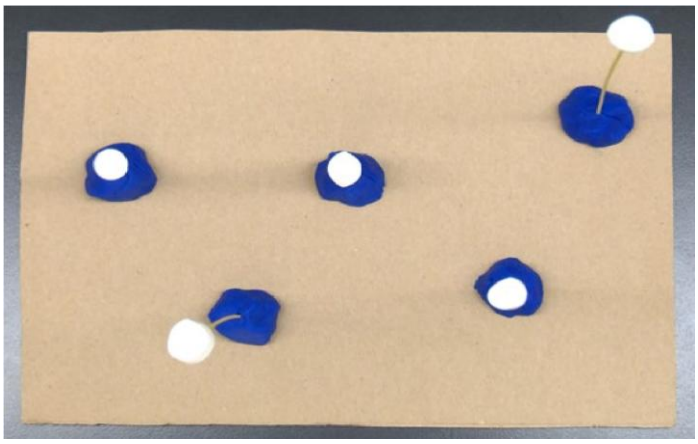
Start the activity with a discussion on the constellations. You can share images of the Big Dipper and Cassiopeia on her throne. Here are some questions and discussion points for the students
(see Information section for details):

- What is a constellation?
- Do you know any constellations? The Big Dipper is by far the most popular constellation. Cassiopeia is less well known, but remains one of the main constellations in the Canadian sky.
- The difference between what is easily seen (a saucepan for the Big Dipper) and the official constellation (a large bear as the Big Dipper). For Cassiopeia, the shape recognized in the sky is a "W", whereas this constellation represents a queen.
- Mythology (history) of the constellations, in particular Cassiopeia and the Big Dipper.

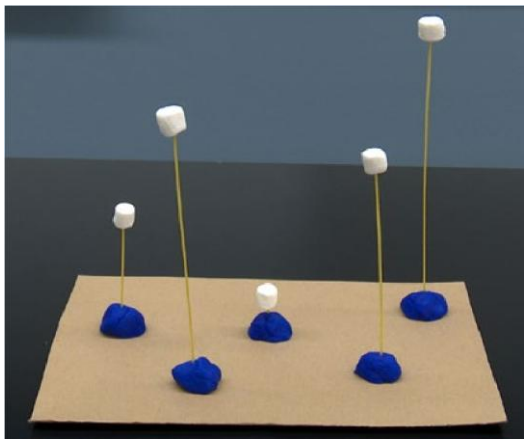
DO-IT-YOURSELF

On a sheet of cardboard, the students first place five pieces of modelling clay (about the size of a grape) to represent the stars forming the "W" of Cassiopeia. The clay is used to hold the spaghetti upright. For each star in the constellation, cut a spaghetti to the length indicated in the chart and insert it in the clay. Finally, attach a marshmallow to the end of the spaghetti to represent the star.

It's now easy to see the three-dimensional representation of the constellation. Seen from above, the stars (marshmallows) are indeed arranged in a "W" shape. From the side, however, the stars form a completely different pattern. If we could travel through space to the stars, they would form completely different patterns, and we wouldn't recognize any of the constellations visible from Earth.



View from above.
Photo Credit: Bertrand Nadeau.



View from the side.
Photo Credit: Bertrand Nadeau.

INFORMATION

Constellations are patterns formed from stars, and these can be very far apart.

In our model, the stars on the shortest spaghetti are the furthest from Earth, since we're looking at the model from above. Here's a table showing the true distances of the stars in the Cassiopeia constellation.

Star Name	Distance (light-years)	Length of spaghetti (cm)
Caph	55	23
Schedar	228	17
Navi	613	3
Ruchbah	99	21
Segin	412	10

One light-year is equivalent to around 10,000 billion kilometres, which is thousands of times the width of our Solar System. These stars are all extremely distant from us, but are still within our own galaxy, the Milky Way.

WHAT IS A CONSTELLATION?

Constellations are patterns we have imagined in the sky. They serve as a reference for way finding. They are not "real objects"; they are simply human constructs —imagined. A very long time ago, humans had fun connecting the stars in the sky to create designs, and many of these are the same designs we use today.

WHO INVENTED CONSTELLATIONS??

Many cultures have created their own constellations. The 88 internationally recognized constellations, currently used as the official system, come to us from ancient Greek mythology, as well as European explorers of the 16th and 17th centuries.

Did you know that it would take our fastest spacecraft nearly a million years to reach the nearest star in Cassiopeia?

DID YOU KNOW...?

WHY DON'T THE CONSTELLATIONS LOOK LIKE THEIR NAMES?

It's true that it's sometimes difficult to recognize the official design in the stars. For many, it takes a lot of imagination! Light pollution caused by our city lights prevents us from seeing many of the stars that are less bright, which are sometimes necessary to recognize

the official constellation designs. On the other hand, even without light pollution, we sometimes wonder how the ancient Greeks came up with the constellation patterns!

WHAT IS THE STORY OF CASSIOPEIA ACCORDING TO GREEK MYTHOLOGY?

Cassiopeia is a queen of Ethiopia, wife of King Cepheus and mother of princess Andromeda. Cepheus and Andromeda are also constellations, visible near Cassiopeia in the sky. The story goes that Cassiopeia liked to boast of her beauty and that of her daughter. As punishment, she was condemned to circle the sky on her throne, spending half the year upside down —an undignified position for a queen.

CAN YOU SEE CASSIOPEIA IN THE SKY?

From our latitudes in Canada, Cassiopeia is a circumpolar constellation, meaning it is visible every night of the year. It can be seen to the north. In summer, it appears as a "W" near the northern horizon, while in Winter, it appears as an "M" high in the sky. You can use the star-finder in Activity 2 to locate it.

WHAT IS THE STORY OF THE BIG DIPPER ACCORDING TO GREEK MYTHOLOGY?

The Big Dipper was once Callisto, a woman of great beauty. She had a child with Zeus, father of the gods. When Zeus' wife discovered that he had a child with another woman, she became enraged and turned Callisto into a bear. Many years later, Callisto's son Arcas was hunting in the forest. When he was about to kill a bear, who was in fact his mother, Zeus intervened to protect Callisto and sent them both up into the sky. Thus, they became the Big Dipper and the Little Dipper.

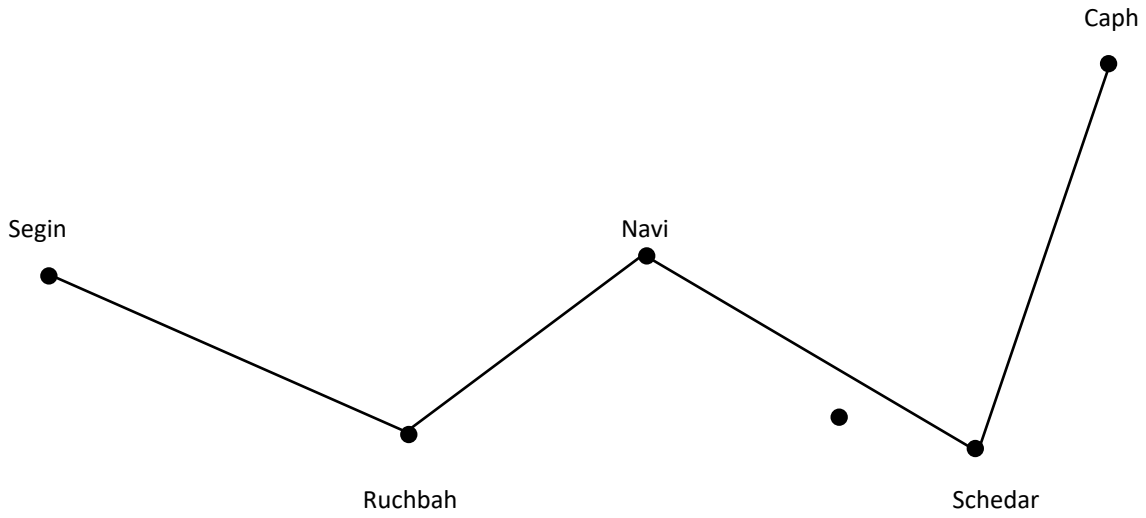
SOURCE

This activity is inspired by *Marshmallow constellation*, an activity in Jim Wiese's book *Cosmic Science*, as well as the *Constellation shape* activity in the *Universe in a Box* guide from the international organization *Universe Awareness* (UNAWE).

TO LEARN MORE

- *Cassiopeia*, *Wikipedia* page.
- *Big Dipper*, *Wikipedia* page.
- *Andromeda*, *Wikipedia* page (to find out more about the Cassiopeia story).
- *List of constellations*, *Wikipedia* page.

CASSIOPEIA



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