

[Satellite](#)[Team](#)[Launch](#)[Mission](#)[Classroom](#)[Press Room](#)[Search](#)[Home](#)**Curriculum:**[Lesson 1](#)>> [Lesson 2.1](#)[Lesson 2.2](#)[Lesson 3](#)[Lesson 4](#)[Lesson 5.1](#)[Lesson 5.2](#)[Made your own model satellite](#)

Lesson 2.1: What is a Satellite?

Objectives:

The student will be able to:

- Define satellite as an object that travels around another;
- Define and recognize the differences between artificial and natural satellites;
- Know that a natural satellite is approximately sphere shaped.

Estimated Lesson Time:

Two classes (1 hour each)

Classroom strategies:

Open classroom with Telstar (song from early 1960's - launched on July 10, 1962). Introduce vocabulary and use visual aids (pictures, globes, etc.).

Science background Information:

A satellite is an object that revolves around another object in a path called an orbit. Satellites can be either natural or artificial (man-made). Our moon is an example of a natural satellite as are all the moons of the other planets. The earth can also be considered a satellite of the sun. Artificial satellites are put into orbit by man. Some examples are weather satellites (GOES), communication satellites (ANIK), navigation satellites (GPS), scientific satellites (TERRIERS), and military satellites (MILSTAR). The first artificial satellite, Sputnik 1, was launched by the Soviet Union on October 4, 1957 - the US launched Explorer-1 in January 1958. Congress established National Air and Space Administration (NASA) on October 1, 1958 - this was the start of the "Space Race" (add these to the time line). Prior to the creation of NASA, the US space effort was a military controlled enterprise (reference to the Cold War, nuclear scare, post-WWII missile development).

Vocabulary:

1. Satellite - An object that orbits another object.
2. Natural satellite - A small or secondary planet which revolves

- around a larger one.
3. Artificial satellite - A man-made object placed (or designed to be placed) in orbit around an astronomical body (usu. the earth).
 4. Sphere - A geometrical solid figure formed by the complete revolution of a semicircle about its diameter; a round body of which the surface is at all points equidistant from the center.
 5. Orbit - The path or course of a heavenly body; the curved path described by a planet or comet about the sun, by a satellite about its primary, or by one star of a binary system about the other.
 6. Revolve - To perform a circular motion in a regular orbit about or round a fixed point outside the body.
 7. Rotate - To perform a circular motion in a regular orbit about or round a fixed point inside the body.

Materials and Equipment:

Timeline, music, bubble solution, string, straws, plate or bowl for solution, balloons, pictures, globes or other spherical objects.

Advance Preparation:

Get pictures of natural (e.g., Moon, Io - moon of Jupiter) and artificial (e.g., Hubble Space Telescope, GOES) satellites

Activity:

To motivate activity on satellites, ask class about significance of 1957 from their last homework assignment. Objective 1, 2. Teacher will introduce vocabulary using questioning and pictures (natural and artificial satellites) and visual aids (balls, globes, etc.) - possible approach: compare and contrast Sputnik and the Moon. Objective 3. Students construct bubble wands of different shapes using a variety of materials (use straws bent into many shapes - cubes, triangles, ellipses, squares, etc.; or use string to make big bubbles). Regardless of shape, bubbles always become spherical. Bubbles are naturally spherical - natural tendency for that shape (teacher note - this is because of surface tension). Natural satellites are spherical too, but for a different physical reason - gravity will produce sphere shaped bodies in space - this is also a natural tendency.

Follow-up activity: Discuss results of "bubble" activity.

Homework Assignment:

Journal exercise, after day #1 - What was important about the establishment of NASA?

Enrichment Activity:

Try a make device to create a non-spherical bubble. Report on how this was or was not accomplished. Demonstrate process.

References:

1. Travelling in Space (Troll Associates)
2. Satellite Timeline (Chronological Reference):
<http://solar.rtd.utk.edu/~mwade/chrono/chrono.htm>
3. Satellite Encyclopedia Web page:
<http://solar.rtd.utk.edu/~mwade/spaceflt.htm>

Connections:

Music: Telstar (the song)

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