

MISCONCEPTIONS ABOUT SATELLITES – AND MORE

1. All satellites are man-made. (F)

- A satellite is an object that moves around a larger object. Earth is a satellite because it moves around the sun. The moon is a satellite because it moves around Earth. Earth and the moon are called "natural" satellites.
- Usually when someone says "satellite," they are talking about a "man-made" satellite. Man-made satellites are machines made by people. These machines are launched into space and orbit Earth or another body in space. (What is a Satellite? <https://www.nasa.gov/audience/forstudents/5-8/features/nasa-knows/what-is-a-satellite-58.html>)

2. All satellites are the same distance from earth. (F)

3. All satellites travel in the same direction. (F)

4. All satellites travel at the same speed. (F)

- Satellites orbit Earth at different heights, different speeds and along different paths. The two most common types of orbit are "geostationary" and "polar."
- A geostationary satellite travels from west to east over the equator. It moves in the same direction and at the same rate Earth is spinning. From Earth, a geostationary satellite looks like it is standing still since it is always above the same location.
- Polar-orbiting satellites travel in a north-south direction from pole to pole. As Earth spins underneath, these satellites can scan the entire globe, one strip at a time. (What is a Satellite? <https://www.nasa.gov/audience/forstudents/5-8/features/nasa-knows/what-is-a-satellite-58.html>)

5. Artificial satellites remain in orbit because they have escaped Earth's gravity. (F)

- A satellite orbits Earth when its speed is balanced by the pull of Earth's gravity. Without this balance, the satellite would fly in a straight line off into space or fall back to Earth. (What is a Satellite? <https://www.nasa.gov/audience/forstudents/5-8/features/nasa-knows/what-is-a-satellite-58.html>)
- Gravity keeps satellites from flying straight off into interstellar emptiness. Satellites stay in space because of their tremendous horizontal speed, which allows them -- while being unavoidably pulled toward Earth by gravity -- to fall "over the horizon." The ground's curved withdrawal along the Earth's round surface offsets the satellites' fall toward the ground. Speed, not position or lack of gravity, keeps satellites up.

6. Artificial satellites cannot be seen with the unaided eye. (F)

- Many people are surprised that objects orbiting hundreds of miles above our heads can be readily seen without the use of binoculars or a telescope. British astronomer Desmond King-Hele once noted that a satellite, "looks like a star that has taken leave of its senses and decided to move off to another part of the sky." (Most Popular Skywatching Misconceptions Explained <https://www.space.com/13609-skywatching-night-sky-popular-misconceptions.html>)
- If you go out and carefully study the sky near dusk or dawn, the odds are that you will see a satellite now in orbit within 15 minutes. Most are too faint to be seen with the unaided eye, but a few hundred are large enough and low enough (100 to 400 miles/160 to 640 kilometers above Earth) to be seen. Satellites are seen at night because they are illuminated by the sun. A satellite entering the Earth's shadow immediately vanishes from view and pursues an unseen path until it again emerges into full sunlight.

7. Satellites do not crash into each other. (F)

- NASA and other U.S. and international organizations keep track of satellites in space. Collisions are rare because when a satellite is launched, it is placed into an orbit designed to avoid other satellites. But orbits can change over time. And the chances of a crash increase as more and more satellites are launched into space. In February 2009, two communications satellites - one American and one Russian - collided in space. This, however, is believed to be the first time two man-made satellites have collided accidentally.
- There are an estimated half-million artificial objects in Earth orbit today, ranging in size from paint flecks up to full-fledged satellites — each traveling at speeds of thousands of miles an hour. Only a fraction of these satellites

are useable, meaning that there is a lot of "space junk" floating around out there. With every thing that is lobbed into orbit, the chance of a collision increases. (Space Debris https://www.nasa.gov/mission_pages/station/news/orbital_debris.html)

8. The U.S. launched the first successful satellite. (F)

- Sputnik 1, launched by the Soviet Union in 1957, was the first satellite in space.
- NASA has since launched dozens of satellites into space, starting in 1958 with Explorer 1, America's first man-made satellite. The main instrument aboard was a sensor that measured high-energy particles in space called cosmic rays. The first satellite picture of Earth came in 1959, from NASA's Explorer 6. TIROS-1 followed in 1960 with the first TV picture of Earth from space.

9. The International Space Station is the largest man-made satellite. (T)

10. There are over 6,000 satellites orbiting the earth. (F)

- According to the Index of Objects Launched into Outer Space maintained by United Nations Office for Outer Space Affairs (UNOOSA), there were 4,256 satellites currently orbiting the planet in 2016.
- The Union of Concerned Scientists (UCS) details which satellites are operational, and it is not as many as you think! According to their June 2016 update, there are currently only 1,419 operational satellites – only about one third of the number in orbit.

11. The U.S. has the most currently operational satellites. (T)

- According to UNOOSA around 65 countries have launched satellites, although on the UCS database there are only 57 countries listed with operational satellites; some satellites are listed with joint/multinational operators.
- Countries that have launched the most satellites include: USA with 576 satellites; China with 181 satellites; and Russia with 140 satellites.

12. Satellites are primarily used for military purposes. (F)

- Satellites are used for many purposes. Common types include military and civilian Earth observation satellites, communications satellites, navigation satellites, weather satellites, and space telescopes. Space stations and human spacecraft in orbit are also satellites.
- Some studies suggest least 50% of usable satellites have been used for military purposes at some point in their lifespan. (How many satellites are orbiting the earth? <http://www.pixalytics.com/tag/satellite-users/>)
- According the UCS data, the main purposes for current (as of 2016) operational satellites (total 1,419) are: Communications - 713 satellites; Earth observation/science -374 satellites; Technology Demonstration/Development - 160 satellites; Navigation & Global Position -105 satellites; and Space Science - 67 satellites.
- There are four main types of users listed in the UCS database:
 - 94 satellites - civil users, mainly educational institutes
 - 46% technology development
 - 43% Earth/Space science development and observation
 - 579 satellites - commercial users who market the collected data
 - 84% communications and global positioning services
 - 12% Earth observation satellites
 - 401 satellites - Government users, mainly national Space organizations
 - 40% communications and global positioning
 - 38% Earth observation
 - 12% space science development
 - 10% technology development
 - 345 satellites - military users
 - 89% communications, Earth observation, global positioning

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