

## Research This

### Space Junk

**Skills:** Researching, Analyzing, Communicating

SKILLS  
HANDBOOK  A4.1

Space junk is debris from artificial objects orbiting Earth. It is just one example of how beneficial technology can have unwanted environmental effects. In this activity, you will research space junk and discover how an orbiting body can go from being a functioning satellite to being space junk.

1. Research the mechanisms that satellites have to maintain speed and orbital radius.
  2. Research methods of dealing with different forms of space junk.
  3. Explore one story of space junk that catches your interest.
- A. Review this chapter's formulas pertaining to the relationship between orbital speed and orbital radius. Describe effects that could make a satellite slow down in its orbit and slip into a lower orbit. **C A**
- B. Describe what happens when a satellite drifts so low that it enters Earth's atmosphere. **C A**
- C. Are there any ways to avoid creating space junk? **TA C**
- D. Are there any effective ways to get rid of existing space junk? **C A**
- E. Compose an email to a friend describing what space junk is. Include the interesting example you researched in Step 3. **C**



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- A.** Air resistance will slow a satellite and cause it to slip into a lower orbit.
- B.** The satellite may hit other satellites or burn up in the atmosphere.
- C.** Sample answer: Yes. Different styles of rockets and boosters are being considered for space missions. Another way to reduce space junk is to equip satellites with small boosters that would enable them to fall to Earth once they have become obsolete.
- D.** Sample answer: Space junk is regularly falling to Earth. To speed up the removal of space junk, specific missions to remove space junk can be undertaken. A proposed technology that could help reduce the amount of space junk is a "laser broom." A laser broom is a ground-based laser beam that would heat space junk enough to cause it to break apart into much smaller pieces or change direction and fall to Earth.

**E.** Answers may vary. Sample answer:  
Hi Amelia;

I was researching the Internet and found out that space junk is actually many types of debris. According to the NASA Orbital Debris Space Program Office space junk is

- abandoned spacecraft or spacecraft parts that no longer work—these items float around in space circling Earth until they fall back down or collide with other space junk
- upper stages of launch vehicles—these are parts of space shuttles that are fired off or ejected in stages, usually the upper parts of the rocket which get ejected last and are trapped in Earth's orbit
- solid rocket fuel—some space shuttles use solid rocket fuel for propulsion and some can be left over after launch in the container in which it was sent up
- tiny flecks of paint—when spacecraft enters space, heat or collisions with small particles chip paint from the surface of the spacecraft

I find it interesting that paint flecks are considered space junk, and despite their size they can actually do quite a bit of damage when they strike objects. Space junk can orbit Earth at a speed of more than  $3.5 \times 10^4$  km/h. If a speck of paint travelling at that speed hits a space station, it can create a 0.6 cm diameter hole in the window of the space station. Hard to believe something that small can cause a lot of damage!