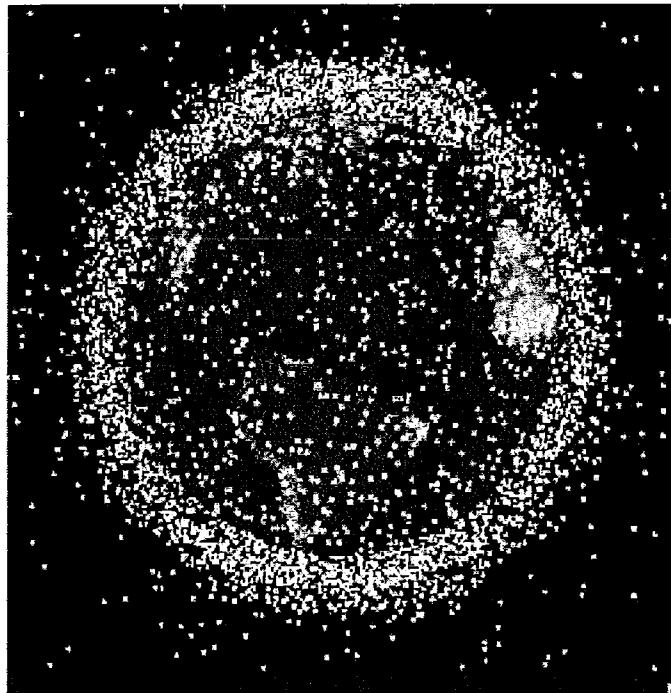


Space Debris and Human Spacecraft

Space junk or space debris are pieces of manmade objects floating around in space outside of Earth's atmosphere left over from trips to the moon, rockets orbiting Earth, and satellites. More than 500,000 pieces of debris, or "space junk," are tracked as they orbit the Earth. They all travel at speeds up to 17,500 mph, fast enough for a relatively small piece of orbital debris to damage a satellite or a spacecraft. This is tens times faster than the average bullet.

The rising population of space debris increases the potential danger to all space vehicles, but especially to the International Space Station, space shuttles and other spacecraft with humans aboard. Suits worn by astronauts outside on spacecrafts are made of Kevlar to protect them. Kevlar is the material used to make bullet proof vests.

NASA takes the threat of collisions with space debris seriously and has a long-standing set of guidelines on how to deal with each potential collision threat. These guidelines, part of a larger body of decision-making aids known as flight rules, specify when the expected proximity of a piece of debris increases the probability of a collision enough that evasive action or other precautions to ensure the safety of the crew are needed.



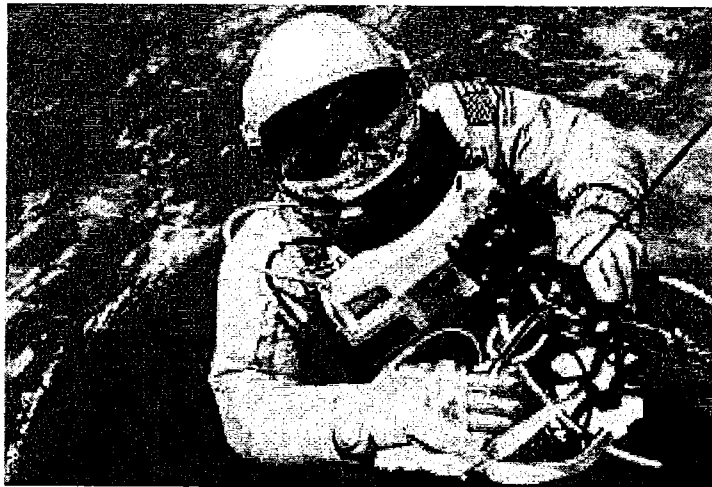
The Locations of Pieces of Space Junk in Space around Earth

Orbital Debris

Orbital debris is any man-made object in orbit about the Earth which no longer serves a useful function. Such debris includes nonfunctional spacecraft, abandoned launch vehicle stages, mission-related debris and fragmentation debris.

There are more than 20,000 pieces of debris larger than a softball orbiting the Earth. They travel at speeds up to 17,500 mph, fast enough for a relatively small piece of orbital debris to damage a satellite or a spacecraft. There are 500,000 pieces of debris the size of a marble or larger. There are many millions of pieces of debris that are so small they can't be tracked.

Even tiny paint flecks can damage a spacecraft when traveling at these velocities. In fact a number of space shuttle windows have been replaced because of damage caused by material that was analyzed and shown to be paint flecks.

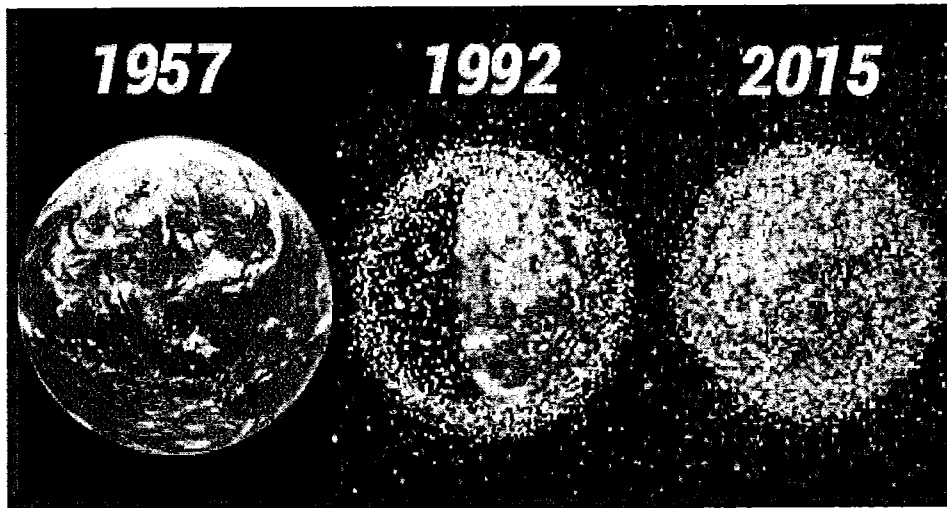


Humans in space outside the spacecraft are in the most danger from being hit by space debris

With so much orbital debris, there have been surprisingly few disastrous collisions. In 1996, a French satellite was hit and damaged by debris from a French rocket that had exploded a decade earlier. On Feb. 10, 2009, a defunct Russian satellite collided with and destroyed a functioning U.S. Iridium commercial satellite. The collision added more than 2,000 pieces of trackable debris to the inventory of space junk. China's 2007 anti-satellite test, which used a missile to destroy an old weather satellite, added more than 3,000 pieces to the debris problem.

Planning for and Reacting to Debris

The Department of Defense maintains a highly accurate satellite catalog on objects in Earth orbit that are larger than a softball. NASA has a set of long-standing guidelines that are used to assess whether the threat of such a close pass is sufficient to warrant evasive action or other precautions to ensure the safety of the crew.



This image shows how the amount of space junk orbiting Earth has increased over the years.

Sometimes these encounters with space junk are known well in advance and there is time to move the station slightly, known as a “debris avoidance maneuver”. Other times, the tracking data isn’t precise enough to warrant such a maneuver or the close pass isn’t identified in time to make the maneuver. In those cases, the control centers may agree that the best course of action is to move the crew into the Soyuz spacecraft that are used to transport humans to and from the station. This allows enough time to isolate those spaceships from the station by closing hatches in the event of a damaging collision. The crew would be able to leave the station if the collision caused a loss of pressure in the life-supporting module or damaged critical components. The Soyuz act as lifeboats for crew members in the event of an emergency.

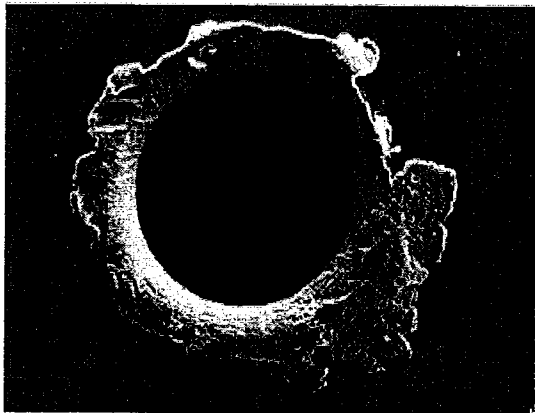
Mission Control also has the option of taking additional precautions, such as closing hatches between some of the station’s modules, if the likelihood of a collision is great enough.

Maneuvering Spacecraft to Avoid Orbital Debris

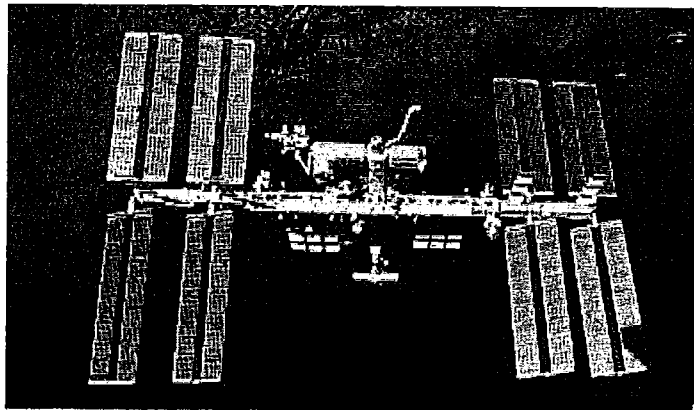
NASA has a set of long-standing guidelines that are used to assess whether the threat of a close approach of orbital debris to a spacecraft is sufficient to warrant evasive action or precautions to ensure the safety of the crew.

Debris avoidance maneuvers are planned when the probability of collision from a conjunction reaches limits set in the space shuttle and space station flight rules. If the probability of collision is greater than 1 in 100,000, a maneuver will be conducted if it will not result in significant impact to mission objectives. If it is greater than 1 in 10,000, a maneuver will be conducted unless it will result in additional risk to the crew.

Debris avoidance maneuvers are usually small and occur from one to several hours before the time of the conjunction. Debris avoidance maneuvers with the shuttle can be planned and executed in a matter of hours. Such maneuvers with the space station require about 30 hours to plan and execute mainly due to the need to use the station's Russian thrusters, or the propulsion systems on one of the docked Russian or European spacecraft.



Space Junk Damage to the ISS



ISS or International Space Station

Several collision avoidance maneuvers with the shuttle and the station have been conducted during the past 10 years. Space Junk hitting the international Space Station is a big concern because it has humans on it that could be hurt and also if holes are put in the ISS it could let life sustaining oxygen leak out causing the death of the humans inside.

NASA implemented the conjunction assessment and collision avoidance process for human spaceflight beginning with shuttle mission STS-26 in 1988. Before launch of the first element of the International Space Station in 1998, NASA and DoD jointly developed and implemented a more sophisticated and higher fidelity conjunction assessment process for human spaceflight missions.

In 2005, NASA implemented a similar process for selected robotic assets such as the Earth Observation System satellites in low Earth orbit and Tracking and Data Relay Satellite System in geosynchronous orbit. In 2007, NASA extended the conjunction assessment process to all NASA maneuverable satellites within low Earth orbit and within 124 miles (200 kilometers) of geosynchronous orbit.

ANSWER THE FOLLOWING QUESTIONS

1. _____ All space junk was made by which of the following
A. Ford B. United States C. Russia D. Humans

2. _____ Some space junk can travel as fast as a
A. A Car B. Running Human C. A Bullet D. A snail

3. _____ Space suits are made of what material to protect the humans that wear the suits from fast moving space junk.
A. Cotton B. Kevlar C. Nylon D. Polyester

4. _____ The answer to question number 3 above is so strong we make vests out of it to stop fast moving objects on Earth. We make vests of this material to stop what on Earth?
A. Humming Birds B. Foul Balls C. Bullets D. Meteors from Space

5. _____ How many pieces of space junk are in space orbiting Earth
A. 1,000,000 B. 700,000 C. 500,000 D. 200,000

6. _____ How many pieces of space junk are the size of a softball or bigger and could do major damage to a spacecraft, satellite, or human on a space walk.
A. 20,000 B. 15,000 C. 10,000 D. 5,000

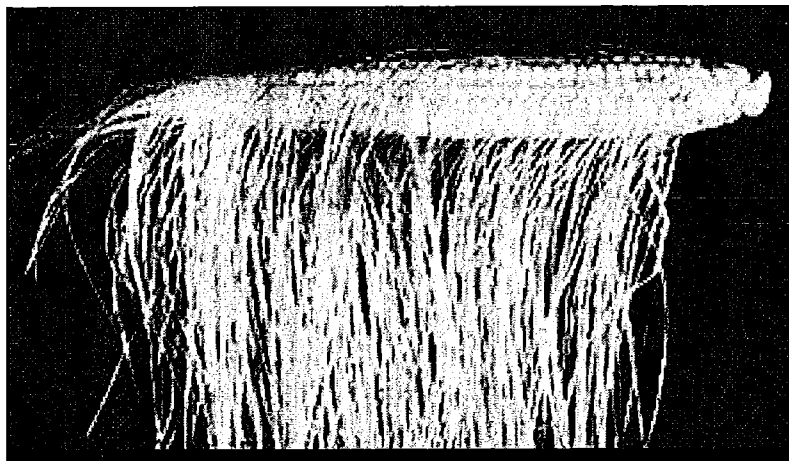
7. _____ Which of the 2 following events caused thousands of pieces of space junk to form with just one incidence in one day.
A. The US enterprise shot a Klingon Warship with a photon torpedo
B. A Russian Satellite collided with a United States satellite
C. The space shuttle Columbia disintegrated reentering Earths atmosphere
D. China tested an anti satellite missile on an old weather satellite

8. _____ What is the main thing we do to avoid having space junk hit spacecrafts?
- A. Shoot space junk with powerful lasers
 - B. Move spacecraft out of the path of space junk
 - C. Shoot the space junk with nuclear bombs
 - D. Have astronauts go out and move the space junk
9. _____ Which of the following space craft do we worry the most about being hit with space junk.
- A. Space probes going to the next sun beyond ours
 - B. Weather satellites that watch for hurricanes
 - C. Cell phone signal satellites used to make calls
 - D. Probes orbiting the Sun studying sunspots
10. _____ There is something very important on the International Space Station. For this reason we do not want the international space station to be hit with a piece of space junk going as fast as a bullet. What is the important thing on the ISS we want to protect.
- A. Cell Phones B. Radioactive materials C. Humans D. Human Babies

1. _____ T or F All animals have 46 chromosomes in the nucleus of their cells.
2. _____ What part of a plant cell acts as the skeleton of the cell.
3. _____ What is considered the brain of the cell because it controls the cell.
4. _____ What energy producing process occurs in the chloroplasts of cells.
5. _____ Mitochondria process what for the cell.
6. _____ T or F We know for sure that genetically modified foods are unhealthy for humans.
7. _____ To genetically engineer an org so the new gene is in every one of its cells we must put the new gene in when the org is how many cells.
8. _____ Is whether or not you have a heart attack nature, nurture, or a mix of both.
9. _____ When a woman has her first baby what percent chance is there that it will be a boy.
10. _____ Which of the reasons below is why it is illegal to genetically engineer or clone a human.

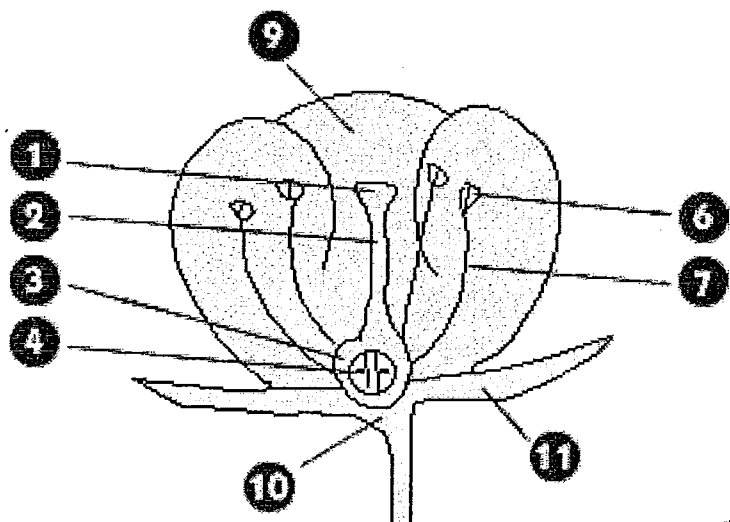
- A. They can lead to messed up humans with birth defects
- B. It could make a human so amazing they would have unfair advantages
- C. There is no way the a genetically engineered or cloned human can survive
- D. It is to expensive to genetically engineer or clone a human
- E.

11. _____ What hormone makes Eli Spears look, act, and dance like a man.
12. _____ What hormone makes Maddie Alto look, act, laugh, and cry like a girl.
13. _____ How many sex chromosomes are in most human cells.



14. _____ Above is a young ear of corn with a bunch of string like structures hanging from it. Are those strings the ovules, pistils, or stamen of flower of the ear of corn.
15. _____ T or F Prokaryotic cells have a nucleus in them.

16. _____ T or F Plants do not have problems with incest. They do not care if they use their own pollen to fertilize their ovules (egg cells)
17. _____ T or F Most mutations are good.
18. _____ Are plants or animals better at doing asexual reproduction
19. _____ Are mammals or birds easier to clone.
20. _____ T or F The egg of a chicken that we eat is the female reproductive cell of the chicken just like the human egg is the female reproductive cell of a human.
21. _____ Would plants rather use their own pollen to reproduce or the pollen from another plant.
22. _____ How many total chromosomes do you have in each body cell.
23. _____ If bigfoot has 24 chromosomes in its sex cells how many chromosomes are in its body cells.



24. Write the following words/phrases in the blanks provided that are labeled with the numbers for the flower parts above in the picture. **Stamen (Male pollen), Ovule becomes seed, Pistil – female becomes fruit.**

4. _____ 2. _____ 7. _____

25. _____ Pollen is the scientific name for plant what