Space Debris

|  |  |
| --- | --- |
| Humans have been sending **satellites** into space for decades. These missions allow us to gain more information about our Sun, the Earth, and other planets, and look deep into space at black holes, distant stars and galaxies. There are also communications satellites, weather satellites, and the **International Space Station.** But what happens to a satellite once it has served its purpose? It continues to circle (orbit) around Earth! **Space debris**, refers to human-made objects that are orbiting the Earth but no longer serve a useful purpose. Examples include large objects such as non-functioning satellites as well as smaller objects such as flecks of paint.Space debris is posing an increasingly large threat to spacecraft and functioning satellites - the more debris that accumulates, the more likely a collision is. Scientists are constantly monitoring large pieces of debris (larger than 10cm) using space telescopes to assess the risk the debris poses. If possible, they take action to protect satellites and spacecraft. The International Space Station sometimes conducts ‘an avoidance manoeuvre’ to prevent damage from debris. However, there are millions of pieces of space debris that are too small to be tracked by scientists, and the number is rapidly increasing. The amount of space debris within Earth’s orbit is now at a point that we can no longer ignore, and the situation is only going to get worse if we do not act. The **European Space Agency’s** (ESA) Clean Space programme is attempting not only to minimise the debris produced by future space missions, but to actively reduce the debris already in orbit.As more collisions occur, debris is broken into smaller and smaller pieces. This means that small pieces of space debris are more common than large pieces. Statistical models estimate the amount of space debris orbiting Earth to be:* 36500 objects greater than 10 cm
* 1000000 objects from 1 to 10 cm
* 330 million objects from 1 mm to 1 cm

The consequences of space debris are significant and can affect both space missions and life on Earth.**1. Damage to Satellites**Space debris can collide with functioning satellites, damaging or destroying them. Satellites are essential for communication, GPS, weather forecasting, and scientific research. Losing these satellites could disrupt many everyday services.**2. Threat to Space Missions**Debris poses a danger to astronauts and spacecraft. Even tiny fragments of debris can cause serious damage because they travel at very high speeds (up to 28,000 km/h). This makes spacewalks and space missions more dangerous.**3. The Kessler Syndrome**This is a scenario where space debris collides with other debris, creating more fragments, leading to a chain reaction. If enough collisions happen, space around the Earth could become so littered with debris that launching satellites or missions could be impossible for a long time.**4. Increased Costs for Space Missions**Because of the threat from debris, spacecraft and satellites need extra shielding and monitoring systems, which increase the cost of missions. Navigating through debris fields also requires more fuel and resources, raising operational costs.**5. Environmental Impact**Some debris in low Earth orbit eventually falls back to Earth, though most of it burns up in the atmosphere. However, larger pieces can reach the ground, potentially causing damage. Additionally, increasing space debris contributes to space pollution, affecting long-term sustainability in space exploration. | **Topic Specific Words & Definitions:****Satellites**A space satellite is a machine that orbits the Earth, helping us communicate, navigate, take pictures, and study space by sending and receiving signals and information.**International Space Station**The International Space Station (ISS) is a large spacecraft that orbits the Earth, serving as a space laboratory where astronauts live and conduct experiments to learn more about space and science.**Space debris**Space debris, is made up of pieces of broken satellites, old rockets, and other discarded objects that float around in space and can pose a danger to active satellites and spacecraft.**European Space Agency**Organisation made up of European countries that works together to explore space, develop technology, and conduct research to learn more about our universe.**Kessler Syndrome**space debris collides with other debris, creating even more fragments and leading to a chain reaction that could make certain areas of space too dangerous to use. |