

Data Set #9

Type of response:	Source Dependent Response
Grade level:	10
Subject:	English
Training set size:	1798
Final evaluation set size:	600
Average length of responses:	40 words
Scoring:	Score1, Score2
Final score:	Final score is score 1. Score 2 is for inter-rater reliability purposes.
Rubric range:	0-2

Reading Passage—Organization of Article Item

Orbiting Junk

Grab your telescope! Look up in the sky! It's a comet! It's a meteor!
It's a . . . tool bag?

Such an observation isn't as strange as it seems. Orbital pathways around our planet that were once clear are now cluttered with the remains of numerous space exploration and satellite missions. This "space junk" is currently of great concern to government space agencies around the globe.

What Is Space Junk?

In 1957, the Soviet Union launched the first artificial satellite. The United States followed suit, and thus began the human race's great space invasion.

Over the past 52 years, a variety of spacecraft, including space capsules, telescopes, and satellites, have been sent beyond Earth's atmosphere. They explore the vast reaches of our solar system, monitor atmospheric conditions, and make global wireless communication possible. The rockets that are used to power these spacecraft typically fall back to Earth and disintegrate in the intense heat that results from friction with Earth's atmosphere. The objects themselves, however, are positioned hundreds of miles above Earth, far from elements that would cause them to degrade or burn up. In this airless environment, some of them continue to circle the planet indefinitely. While this is ideal for a fully functioning object that was launched for that purpose—for example, a communications satellite—what happens when a satellite "dies" or malfunctions and can't be repaired? The disabled object becomes a piece of high-tech junk, circling the globe in uncontrolled orbit.

Crash Course

With no one at the controls, dead satellites run the risk of colliding with each other. That's exactly what happened in February 2009. Two communications satellites, one American and one Russian, both traveling at more than 20,000 miles per hour, crashed into each other 491 miles above the Earth. The impact created hundreds of pieces of debris, each assuming its own orbital path. Now, instead of two disabled satellites, there are hundreds of microsatellites flying through space.

It's not only spectacular crashes that create debris. Any objects released into space become free-orbiting satellites, which means that astronauts must take great care when they leave their spacecraft to make repairs or do experiments. Still, accidents do happen: in 2008, a tool bag escaped from the grip of an astronaut doing repairs on the International Space Station (ISS).

Little Bits, But a Big Deal

So who cares about a lost tool bag or tiny bits of space trash?

Actually, many people do. Those bits of space debris present a very serious problem. Tiny fragments traveling at a speed of five miles per second can inflict serious damage on the most carefully designed spacecraft. If you find that hard to believe, compare grains of sand blown by a gentle breeze to those shot from a sandblaster to strip paint from a concrete wall. At extreme speeds, little bits can pack a punch powerful enough to create disastrous holes in an object moving through space.

Scientists are hard-pressed for an easy solution to the problem of space junk. Both the National Aeronautics and Space Agency (NASA) and the European Space Agency maintain catalogues of known objects. The lost tool bag, for example, is listed as Satellite 33442. But while military radar can identify objects the size of a baseball, anything smaller goes undetected. This makes it difficult for spacecraft to steer clear of microdebris fields. Accepting the inevitability of contact, engineers have added multiple walls to spacecraft and stronger materials to spacesuits to diminish the effects of impact.

Yet the problem is certain to persist. In fact, the amount of space trash is actually increasing because commercial space travel is on the rise and more nations have undertaken space exploration. Space agencies hope that the corporations and nations involved can work together to come up with a viable solution to space pollution.

Prompt—Organization of Article Item

How does the author organize the article? Support your response with details from the article.

Rubric for Organization of Article

2 points

Proficient: The response fulfills all the requirements of the task. The information given is text-based and relevant to the task.

1 point

Partially Proficient: The response fulfills some of the requirements of the task, but some of the information may be too general, too simplistic, or not supported by the text.

0 points

Not Proficient: The response does not fulfill the requirements of the task because it contains information that is inaccurate, incomplete, and/or missing altogether.