Day 6: Comparing Themes Across Texts

English Language Arts

- Analyze the primary source quotes of Apollo 1 astronauts prior to their tragic deaths. Attempt to find a common theme that relates to the previous themes
- Additional Resource
  Video: Apollo 1 Mission Results in Space Changes https://bit.ly/2DXV9gs

The Apollo 1 Mission

Videos of Quotes from the Apollo 1 Astronauts: https://ctm.americanexperience.org

Directions: Consider the words of the following NASA astronauts who were scheduled to lift off in Apollo 1 on February 21, 1967.

- Virgil "Gus" Grissom: **There's always** a possibility that you can have a **catastrophic failure**, of course. This can happen on any flight. It can happen on the last one as well as the first one. You just plan as best you can to take care of all these eventualities, and you get a well-trained crew, and you go fly.
- Ed White: "I think you have to understand the feeling that a pilot has, that a test pilot has, that I look forward a great deal to making the first flight. There's a great deal of pride involved in making a first flight." (The New York Times, January 29, 1967, p. 48.)
- Roger Chaffee: "Oh, I don't like to say anything scary about it. Um, there's a lot of unknowns of course and a lot of problems that could develop, might develop. And they'll have to be solved and that's what we're there for."
- During a test launch approximately a month before their scheduled launch into space, these men suffered a tragic death when they were locked inside of their command module when a fire broke out aboard the ship.

In reading their quotes, what **theme** again presents itself?

1. How is this similar to the theme(s), if at all, that you selected previously for Jefferson and Kennedy's speeches? Explain.

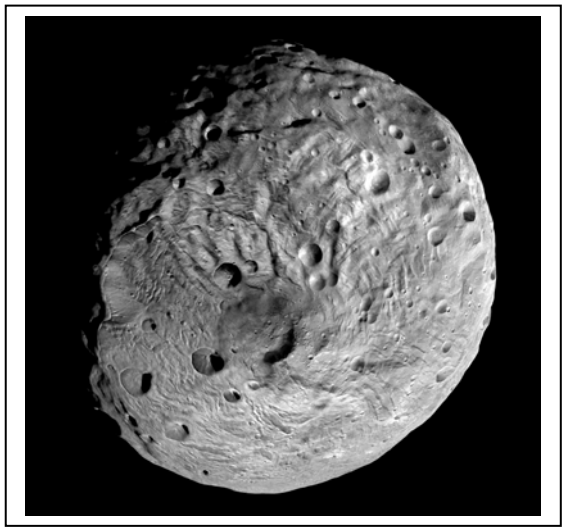
Day 6: Volume of Sphere

Math

Comparing the Volume of various space objects

Materials:

- Calculator



On July 15, 2011 the NASA spacecraft Dawn went into orbit around the asteroid Vesta (photo on the right). Vesta is the second largest asteroid in the Asteroid Belt. Its diameter is 530 kilometers. The diameter of the moon is 1,730 kilometers.

The equation for volume of sphere is = $4/3*\pi r^3$

Problem 1 - Assuming that it is shaped like a sphere, what is the volume of Vesta in cubic kilometers?

Problem 2 - About how many asteroids like Vesta could you fit inside our moon?

Problem 3 - If the Earth has a diameter of 12,756 km, what is the volume of Earth? What about Mars with a diameter of 6794 km?

Day 6: Characteristics of Mars

Science

Materials:

- Paper, colored pencils, markers, crayons, or any other materials to design an alien.
- Your Planet Chart from Day 4 and 5 Science

Using the information you have collected, create an alien from Mars. Plan out and start to design you alien and what they look like.

Alien Project

Imagine that you have arrived on another planet. You look around and see signs of life. What would you expect the alien to look like? As organisms, our characteristics are based on our planet. For example, we breathe oxygen because it is present on our planet. However, on another planet we would not be able to breathe. Another example is that our eyes are a certain size because of how close we are to the sun. If we were in an area of little or no light, we might either have very large eyes (to let in more light) or no eyes at all! Organisms change to meet their environment. The same goes with aliens.

What to do:

In this activity, you are going to be constructing an alien from a planet of your choice. When designing the alien, you need to consider facts about the planet for your alien. Most likely, it will not look like an alien from the movies.

Here are some things to consider when creating your alien:

- What does it eat?
- What does it breathe?
- Does it need a mouth?
- Does it need fur or something to keep warm?
- How does it move around the planet?
- Does it blend into the planet (camouflage) ?

You should draw your alien and label the parts of the alien that you considered when creating your alien. If you give the alien teeth, explain what it eats that it needs teeth. If it doesn't eat, maybe there is no mouth and you could explain that as well. Do not base facts on the name of the planet as that is irrelevant to life forms. For example, don't make an alien from Mars a warrior because Mars is the god of war. That is not important to your alien for survival.

Requirements:

You alien should have:

- Color
- At least 8 parts labeled as to why you designed it the way you did.
- A name
- The name of the planet

Additional Resources

Life on Mars? http://ow.ly/V5cO50AWDRd

Curiosity Rover Hits Paydirt on Mars | NASA Planetary Sciences http://ow.ly/J0Fc50AWDSZ

Mars | Crash Course Astronomy http://ow.ly/eOy050AWDUr

Day 6: Cold War, the Space Race, and Exploration

Social Studies

- Describe America's response to Sputnik in the larger view of the Space Race and Cold War.

- Read "Sputnik' Impact on America (see attached): www.pbs.org/wgbh/nova/article/sputnik-impact-on-america/

- If possible, view Civil Defense film titled "Duck and Cover" that displays the reality of the tension between the Soviet Union and the United States: www.loc.gov/item/mbrs01836081/

- If possible, view the short clip on Sputnik's Launch from PBS: https://bit.ly/3ar6FwX

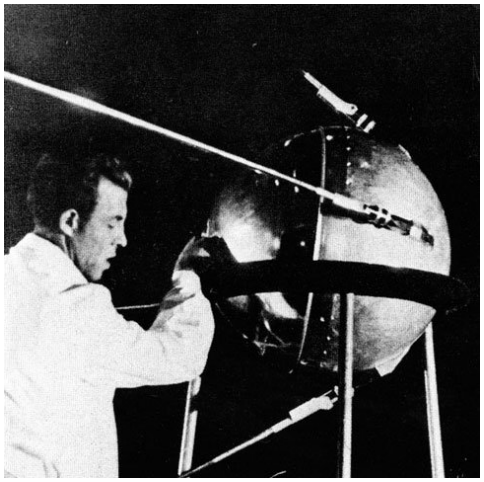
- Complete the attached Sputnik Impact Sheet.

Sputnik's Impact on America

https://www.pbs.org/wgbh/nova/article/sputnik-impact-on-america/
Never before had so small and so harmless an object created such consternation.
—Daniel J. Boorstin, The Americans: The Democratic Experience

"Listen now," said the NBC radio network announcer on the night of October 4, 1957, "for the sound that forevermore separates the old from the new." Next came the chirping in the key of A-flat from outer space that the Associated Press called the "deep beep-beep." Emanating from a simple transmitter aboard the Soviet Sputnik satellite, the chirp lasted three-tenths of a second, followed by a three-tenths-of-a-second pause. This was repeated over and over again until it passed out of hearing range of the United States.

BY PAUL DICKSON TUESDAY, NOVEMBER 6, 2007 NOVA



Sergei Korolev, the engineer behind the 184-pound Soviet Sputnik satellite, was not credited by name until after his death. Courtesy of NASA

The mouse that roared

The satellite was silver in color, about the size of a beach ball, and weighed a mere 184 pounds. Yet for all its simplicity, small size, and inability to do more than orbit the Earth and transmit meaningless radio blips, the impact of Sputnik on the United States and the world was enormous and unprecedented. The vast majority of people living today, at the beginning of the 21st century, were born after Sputnik was launched and may be unaware of the degree to which it helped shape life as we know it.

Now is an especially good time to take a fresh and focused look at the event whose impact looms even larger with the passing of time. In the last decade an incredible amount of once-secret material has been declassified and made public. Scholars and writers both inside and outside government have coaxed key Cold War documents out of hiding. Collectively, this material has given new dimensions and twists to almost every aspect of the events leading up to and following the launch of Sputnik.

For example, one recently released document reveals evidence of a long-forgotten pre-Sputnik "olive branch" extended by Russian scientists, who asked their American counterparts to supply a piece of

scientific equipment for a planned launch. By most indications, this piece of equipment was meant for the third Sputnik.

It was as if this orderly march into the future was a part of America's destiny.

It is not widely known even now that one of the reasons President Dwight D. Eisenhower and those around him did not react with alarm over Sputnik going into space ahead of an American satellite was that Eisenhower welcomed the launch to help establish the principle of "freedom of space" [the idea that outer space belonged to everyone, thereby allowing satellite flights over foreign countries].

At the time of the Sputnik "crisis," the White House, Central Intelligence Agency, Air Force, and a few highly select and trustworthy defense contractors were creating a spy satellite that was so secret that only a few dozen people knew of it. Even its name, CORONA, was deemed secret for many years. Instead of being concerned with winning the first round of the space race, Eisenhower and his National Security Council were much more interested in launching surveillance satellites that could tell American intelligence where every Soviet missile was located.

Although he couldn't publicly admit it without risking national security, President Dwight D. Eisenhower was not greatly surprised by the launch of Sputnik. Courtesy Library of Congress

Heard 'round the world

For many of us born before the 1950s, the fascination and astonishment engendered by the launch of Sputnik remain fresh in our minds. Like many of my generation, I can recall exactly where I was when I heard about Sputnik's launch. I was 18 years old, a college freshman at Wesleyan University in Middletown, Connecticut. A friend stopped me in the middle of the campus to say that he had heard about it on the radio. Instinctively, we both looked up.

Within hours I would actually hear its signal rebroadcast on network radio. Before the weekend was over, I got to hear it directly on a shortwave radio as it passed overhead.

Not only could you hear Sputnik, but, depending on where you were, it was possible to see it with the naked eye on certain days in the early morning or the late evening when the sun was still close enough to the horizon to illuminate it. While standing in the middle of the college football field a week or so after the launch, I first saw the satellite scooting across a dark evening sky orbiting the Earth at a speed of 18,000 miles per hour. Watching Sputnik traverse the sky was seeing history happen with my own eyes. To me, it was as if Sputnik was the starter's pistol in an exciting new race. I was electrified, delirious, as I witnessed the beginning of the Space Age.

The 1939 "World of Tomorrow" World's Fair in Flushing Meadows, New York promoted belief in science and technology and had a powerful influence on a generation of Americans. © Bettmann/CORBIS

A new world

Prior to Sputnik, popular interest in science and technology had been on the rise since as early as the 1939 "World of Tomorrow" World's Fair in Flushing Meadows, New York. I attended the fair, albeit in utero, as I was born three days after my parents' last visit. But they saved many artifacts of the fair for me, including an official guidebook, which fascinated me as a kid and jump-started my interest in all sorts of things, particularly space travel.

That guidebook turned out to be a preview of the future. Exhibits like Ford's "Road of Tomorrow," General Motors' "Futurama," and the multisponsored "Town of Tomorrow" were more than fanciful prototypes; many of their imagined advances made their way into everyday life within a couple of decades. The fair's centerpiece was "Democracity," and it heralded wartime dreams and postwar realities: superhighways, ranch-style houses, rec rooms, workshops for "do-it-yourselfers," and booming suburbs (known as "satellites" in the Democracity display) replete with prefab houses, two-car garages, and stereophonic sound. Something called "television" was actually demonstrated at the RCA exhibit.

The fair's Transportation Pavilion was devoted to space exploration. There was a rocketport, a moonport, and a rocketship shot from a "rocketgun." In one lavish demonstration you could simulate blastoff on a trip to Venus. Once there, you could stroll a primeval jungle inhabited by immense Venusian beasts and a colony of Martians. The fair promised a day when sleek vehicles would take passengers to the planets as easily as they could fly from New York to Chicago. It was as if this orderly march into the future was a part of America's destiny.

As it turned out, the real "world of tomorrow" was delayed because of World War II, but its vision was carried intact into the late 1940s and early 1950s, when it began to be realized. Americans who had struggled through the Great Depression and the war embraced the promise of a burgeoning middle class having goods, services, and comforts that formerly had been the province of European royalty. The average family's car had more pure horsepower than existed in all the stables of Buckingham Palace a generation earlier.

> *"No event since Pearl Harbor set off such repercussions in public life."*

By 1957, a new world was at hand for the United States. The country was creating an interstate highway system; the suburbs were growing; families with two cars and color televisions were becoming the norm. The highest peacetime federal budget in history ($71.8 billion) was in place, and it was the first year in which more than 1,000 computers would be built, bought, and shipped. There were advances in public health, although none more stunning than Dr. Jonas Salk's discovery of a vaccine against polio, the scourge of an entire generation of children.

At the same time, social changes were beginning to transform the United States. A great struggle to achieve a more egalitarian society was beginning. The first civil rights legislation since Reconstruction had been enacted in Congress on September 9, less than a month before Sputnik's launch. The Arkansas National Guard was in Little Rock, Arkansas, enforcing the right of blacks to go to school with whites. Culturally as well, the country was moving to a different beat. Rock 'n' roll had come onto the scene, and Elvis Presley owned the summer of 1957 with his two-sided monster hit record of "Don't Be Cruel" and "Hound Dog."

The Army's Wernher von Braun, seen here with a model rocket, was prevented from making America's first attempt to put a satellite in orbit and was forced to defer to a team from the Naval Research Laboratory. When the Navy's Vanguard failed, von Braun put America in space with Explorer in January, 1958. © Bettmann/CORBIS

A Crisis of Confidence

Just when Americans were feeling self-confident and optimistic about the future, along came the crude, kerosene-powered Sputnik launch. The space race was under way, and the Soviets had won the first leg—the United States was agog and unnerved.

"No event since Pearl Harbor set off such repercussions in public life," wrote historian Walter A. McDougall in The Heavens and the Earth—A Political History of the Space Age. Simon Ramo, space pioneer and cofounder of Thompson Ramo Woolridge, later known as TRW, Inc., wrote in The Business of Science that "the American response to the accomplishment of the Soviet Union was comparable to the reaction I could remember to Lindbergh's landing in France, the Japanese bombing of Pearl Harbor, and Franklin D. Roosevelt's death."

There was a sudden crisis of confidence in American technology, values, politics, and the military. Science, technology, and engineering were totally reworked and massively funded in the shadow of

Sputnik. The Russian satellite essentially forced the United States to place a new national priority on research science, which led to the development of microelectronics—the technology used in today's laptop, personal, and handheld computers. Many essential technologies of modern life, including the Internet, owe their early development to the accelerated pace of applied research triggered by Sputnik.

On another level, Sputnik affected national attitudes toward conspicuous consumption as well, symbolically killing off the market for the Edsel automobile and the decadent automotive tail fin. It was argued that the engineering talents of the nation were being wasted on frivolities. Americans, wrote historian Samuel Flagg Bemis from the vantage point of 1962, "had been experiencing the world crisis from soft seats of comfort, debauched by [the] mass media..., pandering for selfish profit to the lowest level of our easy appetites, fed full of toys and gewgaws, our power, our manpower softened in will and body in a climate of amusement."

While Eisenhower opposed sending men to the moon, John Kennedy made it a national priority. Here, Kennedy views the Saturn launch system with von Braun (center) and NASA Deputy Administrator Robert Seamans. Courtesy NASA-HQ-GRIN

Spur for spacemen

Sputnik also changed people's lives in ways that filtered into modern popular culture. Sputnik was the instrument that gave Stephen King the "dread" that fuels his novels, caused the prolific Isaac Asimov to begin calling himself a science writer rather than a science fiction writer, inspired Ross Perot to create an electronics dynasty, and led others to become cosmonauts and astronauts.

NASA astronaut Franklin R. Chang-Díaz is a case in point. He was born on April 5, 1950, in San José, Costa Rica. On a trip to Venezuela in October 1957, the seven-year-old was told by his mother to look skyward to see the Russian satellite crossing the night sky. Although the young Franklin could not spot Sputnik, he became so infatuated with the fact that human influence had moved into space that he decided then and there that this was his future. Once the American manned space program was under way, he wrote to Wernher von Braun, director of the George C. Marshall Space Flight Center, to find out how he might apply to become an astronaut. In the form letter that came back, he was advised to get a scientific or engineering degree and learn to fly. He also was told that he would have to become an American citizen. The United States, after all, was in a race with the Soviet Union.

At 18 he came to the United States from Costa Rica; he received a bachelor of science degree in mechanical engineering from the University of Connecticut in 1973 and a doctorate in physics from the Massachusetts Institute of Technology in 1977. Along the way he became a U.S. citizen and then in 1981 an astronaut. Chang-Díaz hopes to go to Mars eventually.

On May 25, 1961, President Kennedy tells Congress of his intention for the nation to achieve the goal, "before this decade is out, of landing a man on the Moon...." Courtesy NASA

The space race begins

Politically, Sputnik created a perception of American weakness, complacency, and a "missile gap," which led to bitter accusations, resignations of key military figures, and contributed to the election of John F. Kennedy, who emphasized the space gap and the role of the Eisenhower-Nixon administration in creating it. But although the Sputnik episode publicly depicted Eisenhower as passive and unconcerned, he was fiercely dedicated to averting nuclear war at a time when the threat was very real. His concern for national security took precedence over any concerns about beating the Russians into Earth orbit.

Without Sputnik, it is all but certain that there would not have been a race to the moon.

When Kennedy as president decided to put Americans on the moon, he did so with the belief that voters who had been kids at the time of Sputnik were more willing than their parents to pay the high price of going into space.

Diplomatically, Sputnik helped realign the United States and Great Britain as allies. For a decade, ties between the two nations had weakened partly due to the 1946 Atomic Energy Act, which had deprived the United Kingdom of American nuclear secrets, and partly because of the strong position that the United States had taken against the British and French during the Suez Crisis, which had been prompted by Egypt's seizure of the Suez Canal in July 1956. Now with the common threat of Soviet power implied by Sputnik, NATO was strengthened, guaranteeing the placement of American nuclear arms in Europe. The satellite touched off a superpower competition that may well have acted as a surrogate contest for universal power—perhaps even a stand-in for nuclear world war.

NASA chief historian Roger D. Launius wrote on the 40th anniversary of the launch: "To a remarkable degree, the Soviet announcement changed the course of the Cold War.... Two generations after the event, words do not easily convey the American reaction to the Soviet satellite." Without Sputnik, it is all but certain that there would not have been a race to the moon, which became the centerpiece contest of the Cold War.

By 1968, when this photograph was taken, Wernher von Braun had been director of the Marshall Space Flight Center, developer of the Saturn rockets that got us to the moon, for eight years. A Saturn IB stands at the ready in the background. Courtesy NASA

To the moon

From the outset, wrangling among the branches of the military over control of the rockets that would take the United States into space threatened the success of the American space program even before Sputnik. Eisenhower was at odds with his generals over the program, and each branch of the service had its own aspirations of going into space. The main event pitted the Army's von Braun and his Rocket Team in Huntsville, Alabama against a team from the Naval Research Laboratory. The Army had the mighty Jupiter C rocket and its own Orbiter or Deal satellite (later to become Explorer) pitted against the Navy's experimental Viking rocket and Vanguard satellite.

The most powerful early rockets were developed as weapons—first as German V-2 technology from World War II and ultimately as intercontinental ballistic missiles. The space program seemed destined for civilian control just as the power of the atomic bomb had been taken from the military a decade earlier. The National Aeronautics and Space Administration began in 1958 as a reaction to Sputnik and as a means for turning missiles into launch vehicles for America's civilian space efforts.

President Eisenhower opposed sending men to the moon, but his successor, John F. Kennedy, made a lunar landing a national priority. Receiving virtual carte blanche in budget requests, NASA won the race for the United States, but victory was by no means an easy feat.

National insecurity, wounded national pride, infighting, political grandstanding, clandestine plots, and ruthless media frenzy were but a few of the things the United States had to overcome to bounce back from the blow dealt to the nation by Sputnik.

Editor's Notes

This feature originally appeared on the site for the NOVA program Sputnik Declassified.

Sputnik's Impact on America Responses

Directions:

1. Read "Sputnik' Impact on America: (www.pbs.org/wgbh/nova/article/sputnik-impact-on-america/)
2. If possible, view Civil Defense film titled "Duck and Cover" that displays the reality of the tension between the Soviet Union and the United States: www.loc.gov/item/mbrs01836081/

Complete the following discussion questions regarding what you read and/or viewed in the article and the Duck and Cover video:

1. How did U.S. government officials react to the news of Sputnik in 1957?

2. How did everyday people react?

3. How did the "space race" escalate the Cold War between the United States and the Soviet Union? How was "space" linked to the fear of nuclear war?

Consider the following table of NASA and Defense (Military) spending after the launch of Sputnik. What was the American initial and long term response to the news based on the information presented in "Document I"?

Document I

Source: Office of Management and Budget, US Federal Government, chart created by Beth Scully.

Chart of Federal Spending 1958-1970

Year	NASA % of Budget	Defense % of Budget
1958	0.10%	56.80%
1959	0.20%	53.20%
1960	0.50%	52.20%
1961	0.90%	50.80%
1962	1.40%	49.00%
1963	2.80%	48.00%
1964	4.30%	46.20%
1965	5.30%	42.80%
1966	5.50%	43.20%
1967	3.10%	45.40%
1968	2.40%	46.00%
1969	2.10%	44.90%
1970	1.70%	41.80%

https://www.nasa.gov/pdf/466719main_AP_ED_Hist_RacetoSpace_09-17-09.pdf

Response: