

CLOSE READING

Our National Space Policy

(Genre: Explanatory Text and Policy Statement)



- 1 Part of every U.S. president's job is to set space policy. During the election season, presidential candidates talk about their goals for space exploration. Voters decide if they agree with those goals. Space policy may not seem like an important issue during an election because other issues get a lot more attention in the media.
- 2 In fact, some people are not in favor of more space exploration. They feel that the government has more important business and should focus on helping people. Space programs cost the government many millions of dollars, taking money away from other things government could be doing. However, people might be surprised to learn what else we get for that money in addition to knowledge and a sense of achievement.
- 3 In order to pull off a mission to space, a huge amount of research needs to be done.

This research takes place in all kinds of areas, such as engineering, biology, weather, communications, computer technology, and more. Many inventions that come out of this research have applications beyond the space program. Here are a few benefits that have come from the space program. Some of these advances were developed by NASA, and some were developed by private companies that were commissioned by NASA.

For Your Health

- 4 NASA, along with doctors and a technology company, developed a lifesaving heart pump for patients awaiting heart transplants. The ventricular assist device (VAD) can keep people alive and active until an organ donor is found.
- 5 Before the invention of the ear thermometer, taking your temperature meant sitting for several minutes with a mercury-filled glass tube under your tongue. Modern ear thermometers, developed with NASA's assistance, take your temperature in two seconds. They use the same infrared-detection technology that astronomers use to measure the temperature of distant stars.
- 6 Originally created for NASA, space robotic technology is now adding comfort and function to artificial limbs. Advances include artificial muscle systems with robotic sensing and movement. In addition, NASA's temper foam technology can be used to create natural-looking limbs that have the soft feel of flesh. The foam also provides cushioning that makes prosthetics more comfortable for people to wear.

KEY IDEAS AND DETAILS

For Safety and Convenience

- 7 Speaking of temper (memory) foam, you may have seen the mattresses or pillows that spring back when you touch them. That foam was developed by NASA to improve safety during crashes. It's now being used in safety features for cars, airplanes, amusement park rides, sports equipment, and more. The primary quality of the foam is its ability to absorb energy, which can soften impacts. That feature also makes it very comfortable to sink into. It is even used to make luxurious dog beds!
- 8 A tool company used *Apollo* and *Gemini* mission technologies to make cleaning easier. NASA required a portable, self-contained drill capable of extracting core samples from below the lunar surface. A computer program optimized the design of the drill's motor and reduced its need for power. That computer program made the cordless miniature vacuum cleaner possible.

For the Environment

- 9 A NASA-sponsored coalition of companies, government groups, universities, and nonprofits helped create improvements to solar power cells, making them both lighter and more effective. These new solar cells allow people to reduce the costs and pollution associated with traditional energy sources. The coalition's original goal was to create solar power sources without adding weight to unmanned aircraft.
- 10 NASA technology is being used to clean petroleum-based pollutants from water. The basic technology is thousands of microcapsules—tiny balls of beeswax with hollow centers. Water cannot get inside the

microcapsule, but oil is absorbed right inside. The beeswax spheres float on the water's surface. In this way, oil spills can be captured before they settle into the water, damaging sea life and the ocean floor.

- 11 Water purification is an important part of space missions. Water is heavy to carry, so any water carried onboard needs to be recycled multiple times. NASA engineers in collaboration with private companies developed a water purification system for the astronauts living on the International Space Station. This system can turn wastewater from respiration, sweat, and urine into drinkable water. It's also used to help people all over the world who lack clean water. The system can provide drinkable water from even badly polluted sources.
- 12 Did you know NASA's excess rocket fuel can be used to destroy land mines? Instead of dumping this fuel as waste, NASA shares it with a company that gets rid of land mines. A device with a battery-operated electric match ignites solid rocket fuel placed on the mine. The fuel burns a hole in the mine's case and also burns up the explosive inside, so the mine is safely disarmed.

A man searches for land mines.



CLOSE READING

Our National Space Policy *continued*

And More!

- 13 Space technology has contributed to improvements or new products in all kinds of fields, from photography and art restoration to infant care and clothing manufacturing. In addition, NASA advances spurred technology that has led to smaller and smaller electronic devices, such as cell phones.
- 14 All these new products are great for individuals, but they also help the economy in general. New companies are created, and more people are hired. Of course, part of their paychecks goes to buy more things. In a way, then, some of the money spent on space exploration makes its way back to us all.
- 15 Probably the greatest benefit of the space program is its ability to inspire children's imagination. By motivating students to study science, technology, engineering, and math, our society will advance. The wonders of tomorrow will come from the students we are educating now. They will make devices that we cannot even imagine today.
- 16 So what is NASA's mission? It's inside the United States Space Policy document. These are the guidelines that were given to NASA by President Obama.

Guidelines for Space Science, Exploration, and Discovery

- NASA shall set far-reaching exploration milestones. By 2025, begin crewed missions beyond the Moon, including sending humans to an asteroid. By the mid-2030s, send humans to orbit Mars and return them safely to Earth.
- NASA shall continue the operation of the International Space Station (ISS), in cooperation with its international partners, likely to 2020 or beyond.
- NASA shall seek partnerships with the private sector to enable safe, reliable, and cost-effective commercial spaceflight capabilities and services for . . . the ISS.
- NASA shall implement a new space technology development working with industry, academia, and international partners . . . that can increase the capabilities, decrease the costs, and expand the opportunities for future space activities.
- NASA shall conduct research and development in support of next-generation launch systems, including new U.S. rocket engine technologies.
- NASA shall maintain a sustained robotic presence in the solar system to: conduct scientific investigations of other planetary bodies; demonstrate new technologies; and scout locations for future human missions.
- NASA shall continue a strong program of space science for observations, research, and analysis . . . to enhance knowledge of the cosmos, . . . understand the conditions that may support the development of life, and search for planetary bodies and Earth-like planets in orbit around other stars.



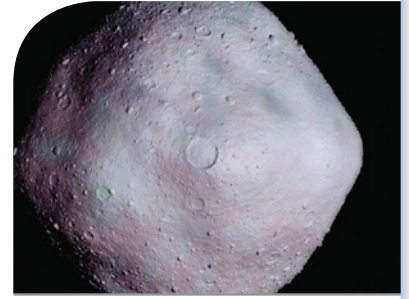
KEY IDEAS AND DETAILS

- And NASA shall pursue capabilities . . . to detect, track, catalog, and characterize near-Earth objects to reduce the risk of harm to humans from an unexpected impact on our planet and to identify potentially resource-rich planetary objects.

Going to an Asteroid?

- 17 Did you notice the goal of sending humans to an asteroid by 2025? NASA is also working with the University of Arizona on a mission called OSIRIS-REx in which a robot probe would approach and take samples of an asteroid named Benu. Then the probe would tow the asteroid into the Moon's orbit, where astronauts can study it.
- 18 Benu is a 500-ton asteroid in a near-Earth orbit. That might sound enormous, but Benu is small enough to burn up in Earth's

atmosphere. It is rated 0 on the Torino Scale, used to measure how dangerous an asteroid might be to Earth. The OSIRIS-REx mission may help us learn to deflect more dangerous asteroids in the future.



The asteroid Benu

- 19 Benu is also rich in carbon, the building block of life on Earth. Scientists hope that it may help answer questions about why Earth is abundant in carbon, unlike other planets.
- 20 In less than 100 years, humans will have gone from gazing at the stars to capturing asteroids—and the possibilities for future knowledge from and exploration of space are as boundless as the universe itself.

Comprehension Check

- 1A.** The space technology we use is mostly developed by
- NASA.
 - private companies.
 - NASA and private companies working together.
 - neither NASA nor private companies.
- 1B.** What phrase from the text supports the answer to Part A?
- “new companies are created”
 - “a NASA-sponsored coalition”
 - “originally created for NASA”
 - “NASA technology”
- 2A.** What can you infer about most advances in new space technology?
- They are a result of problem solving.
 - They are a result of wasteful spending.
 - They are an attempt to recycle waste.
 - They are lucky accidents.
- 2B.** What sentence from the text best supports the answer to Part A?
- “Did you know NASA’s excess rocket fuel can be used to destroy land mines?”
 - “NASA technology is being used to clean . . . pollutants from water.”
 - “Modern ear thermometers . . . take your temperature in two seconds.”
 - “[Memory] foam was developed by NASA to improve safety.”

CLOSE READING

- 3A.** Which of the following is a main idea that is supported by the text?
- Space exploration is very expensive.
 - Some people are not in favor of a space policy.
 - It's important to have a space policy.
 - all of the above
- 3B.** What detail from the text best supports the answer to Part A?
- Other issues get more attention than space policy.
 - The U.S. president sets space policy.
 - NASA's mission is stated in the Space Policy document.
 - The space program inspires students to study science and engineering.
- 4A.** What is the main reason for having a space policy?
- to advance consumer products
 - to set goals for exploration and research
 - to make rules for how to treat alien life
 - to spend more money helping people
- 6.** What is the key quality of temper (memory) foam, and why does it have so many uses? Explain.

- 4B.** What detail from the text does NOT support the answer to Part A?
- "NASA shall continue a strong program of space science . . ."
 - "NASA shall seek partnerships with the private sector . . ."
 - "NASA shall set far-reaching exploration milestones."
 - "NASA shall conduct research and development in support of next-generation launch systems . . ."
- 5A.** Which part of the nation's policy addresses asteroids?
- "maintain a sustained robotic presence in the solar system"
 - "detect, track, catalog, and characterize near-Earth objects"
 - "seek partnerships with the private sector"
 - "continue the operation of the International Space Station"
- 5B.** Which words from that part of the policy are a clue to answer Part A?
- "near-Earth objects, impact"
 - "Earth-like planets, life"
 - "decrease costs, expand opportunity"
 - "launch systems, engine"

KEY IDEAS AND DETAILS

7. What is an asteroid, and why does NASA want to study one?

8. Summarize how the OSIRIS-REx mission to study an asteroid is supposed to work.

9. Write a paragraph summarizing the text that tells how events in space research have positively affected everyday people's lives. Explain your answer using evidence from the text. Use a separate piece of paper if you need more space for your answer.

10. Below are three claims that one could make based on the United States Space Policy.

- The United States is mainly committed to protecting its own interests in space.
- The United States supports cooperative efforts in the exploration of space.
- The United States intends to transfer responsibility for space exploration from the government to private organizations.

A. Underline the claim that is supported by the most relevant and sufficient evidence within the Space Policy excerpt.

B. On a separate piece of paper, write two facts that best provide evidence to support the claim you underlined in Part A.