Articles and Questions

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1) a PDF file

*and*

2) a Word file

These files contain **only** the article and questions. They do **not** contain Answer Keys.

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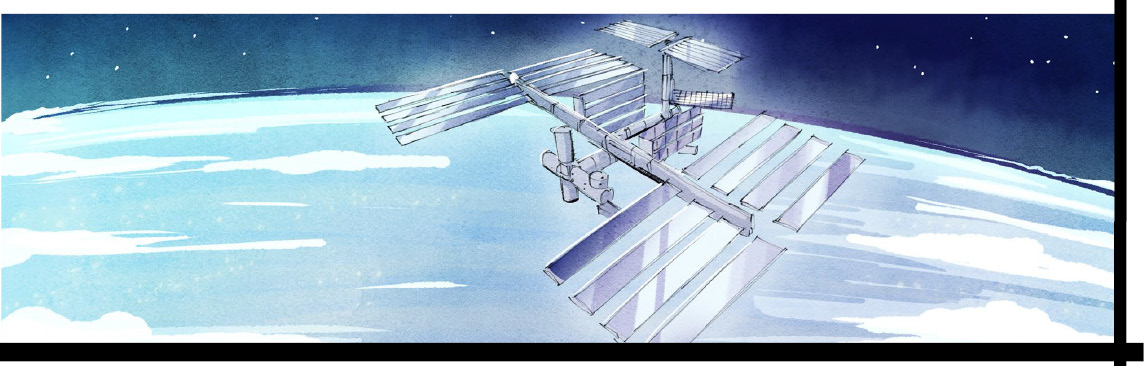
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**Stranded in Space**



Mission Pilot Sunita (Suni) Williams and Mission Commander Barry (Butch) Wilmore went to space for eight days. It may be eight months.

On June 5, the **NASA** astronauts blasted off in Boeing’s Starliner spacecraft for the **International Space Station** (ISS), an orbiting space lab 400 kilometres above Earth.

This was the Starliner’s first crewed test flight. The Starliner has not been certified as operational. Things soon went wrong. The capsule developed leaks that affected the **propulsion** system. During the approach to the ISS, several thrusters used to maneuver also failed. The astronauts docked safely, but the malfunctions worried NASA. It wasn’t clear why the problems occurred.

Weeks turned to months as experts sought answers. After extensive testing, NASA made its call. The risks were too great; the Starliner would travel back to Earth empty.

On September 7, the two stranded astronauts watched as the Starliner left without them. It landed safely on Earth. The new plan is for them to stay on the ISS until next February.

**Veteran astronauts**

Both astronauts are retired navy captains and longtime NASA astronauts. Both have visited the ISS before. “This is my happy place,” said Ms. Williams in a press conference last September. “I love being up here.”

Even so, Ms. Williams, worries about missing precious face-to-face time with her mother. Mr. Wilmore will be in space for much of his youngest daughter’s final year of high school.

Adjusting to the unexpected is what astronauts are trained for. The two new arrivals settled into ISS life quickly, helping with maintenance and experiments. Ms. Williams is scheduled to take command of the space station in October.

There were seven astronauts on the ISS when the Starliner arrived; Ms. Williams and Mr. Wilmore made nine. In early September, a Russian spacecraft carrying three astronauts brought the total to 12.

**A lab in space**

The first part of the ISS was sent up in 1998. In November 2000, the first crew arrived. The ISS has been continuously occupied since that time.

The station was the result of unprecedented collaboration between the U.S., Russia, Japan, Canada, and the European Space Agency. It shows what's possible if countries work together. But the ISS era is winding down.

Thousands of scientific experiments have been conducted on the ISS. Research has included investigating diseases, studying new states of matter, developing ways to grow food in space, and many more.

The ISS is 109 metres long—about the length of a football field. It weighs more than 400 tonnes. The living and working space of the ISS includes six sleeping compartments, each about the size of a phone booth, and two bathrooms. A gym lets crew members work out to fight muscle and bone loss from low gravity. A bay window offers a 360-degree view of space.

The station is a marvel, but it is aging. Plans are underway for its demise in 2031. The station will be pushed out of orbit to fall through Earth’s atmosphere and crash into the ocean.

There is no plan for another ISS, nor will NASA build its own. Instead, private companies will develop space stations, which NASA will use as needed—like renting a hotel room or an office, but in space. NASA won’t be the only client. These space stations could become research laboratories or space tourist destinations.

The change from the ISS to privately-owned space stations seems symbolic. Once the domain of government agencies and programs, space is becoming increasingly privatized.

**The Space Race**

Starting in the late 1950s, the United States and the **Soviet Union** raced each other into orbit, fighting for ‘firsts’ in the Space Race.

In 1956, the **USSR** launched Sputnik-1, the first artificial satellite. In 1961, **cosmonaut** Yuri Gagarin became the first human to travel to space. In 1969, NASA astronauts Neil Armstrong and Buzz Aldrin became the first to walk on the moon.

The 1980s ushered in NASA’s reusable Space Shuttle program. From 1981 to 2011, five space shuttles flew 135 missions. The shuttles launched and recovered satellites, conducted research, and helped build the ISS.

The end of the Space Shuttle program left a gap. With no shuttles, NASA had to rely on Russian spacecraft to transport astronauts to the ISS.

The U.S. government offered money and assistance to companies who could fill the need. Private spaceships were already being built; in the early 2000s, companies like Blue Origin (founded in 2000) and SpaceX (founded in 2002) began working on space travel. Now NASA needed them. A new ‘space race’ had begun.

In 2012, the SpaceX Dragon became the first private spacecraft to dock with the ISS. In 2020, SpaceX made history again when its new Crew Dragon spacecraft carried astronauts to the space station.

NASA no longer relied on Russia for access to space. And space travel, it seemed, was no longer a government affair.

**To boldly go…**

Why use private companies? Why doesn’t NASA build a spacecraft or a new space station? Basically, it’s to free up money, and time, to focus on other bigger objectives.

In 2014, Administrator Charles Bolden—the top NASA official—said that “turning over low-Earth orbit transportation to private industry will… allow NASA to focus on an even more ambitious mission — sending humans to Mars.”

In 2017, NASA Instructor and Flight Controller Robert Frost added to this idea. “The role of government in space exploration is to do the things that the market can’t support, but the people agree are beneficial.” In other words, NASA’s role is to push ahead—to break barriers and pursue science that may not make money but may, eventually, benefit us all.

**The Starliner**

The Starliner spacecraft was designed and built by Boeing, a global aerospace company that has experienced a number of recent setbacks. Boeing develops, manufactures, and services commercial airplanes, defense products, and space systems.

The Starliner uses an Atlas V rocket to launch into space. It includes a reusable Crew Module and a single-use Service Module that provides energy to the spacecraft and contains the engines and cooling system. The Service Module is jettisoned before reentry. The Crew Module uses a parachute and an airbag to land.

The Crew Module is cone-shaped with a diameter of 4.6 metres at its base. It can hold up to seven passengers, or fewer if cargo needs to be transported.

**Space-age developments**

Space leads the way, and private industry finds ways to use the technology. Since 1976, technology developed for space exploration has helped create over two thousand spinoff products. Some are obvious—think of communication satellites used by phone companies. Others are less so. Memory-foam mattresses, Bluetooth headphones, vacuums, and ski suits all originated with technology designed for space. There have been medical advances, too, including laser eye surgery and improvements in artificial hearts and mammograms.

**cosmonaut**: a Russian astronaut (China's astronauts are called Taikonauts)

**international space station:** an orbiting space station used for scientific and space research, constructed between 1998 and 2011 with help from 15 nations

**NASA:** U.S. federal independent agency responsible for the civil space program, aeronautics research, and space research **propulsion**: the force that drives something forward

**Soviet Union / USSR:** a former federal union of 15 nations in eastern Europe and western and northern Asia, comprising the larger part of the former Russian Empire: formed in 1921 and dissolved in December 1991

**Comprehension Questions**

1. What does **NASA** stand for? What is the purpose of this American agency?

2. When did the 'Space Race' begin? What two countries competed with each other? Explain.

3. What does **ISS** stand for? What is it and how long has it been in space?

4. List at least four important facts about the ISS.

5. How did NASA transport astronauts and supplies to and from the ISS in the 1980s? Explain

6. When the shuttles were retired, what was NASA's plan to continue an astronaut taxi service to the ISS?

7. Which company developed the Starliner?

8. Describe what the Starliner is and how it works.

9. What happened during the recent Starliner test mission to send two astronauts to the ISS? What did NASA decide?

10. When are Sunita Williams and Barry Wilmore now expected to return to Earth?

**Questions For Further Thought**

1. Reread the following passage from the article: "***The station [ISS] was the result of unprecedented collaboration between the U.S., Russia, Japan, Canada, and the European Space Agency. It shows what's possible if countries work together.***"

As you see it, how might this quote apply to events happening in the world today? Give examples to support your ideas.

2. The International Space Station will be shut down in 2031 with no plans to rebuild. Instead, private companies will develop space stations which can serve as research laboratories, space tourist destinations, or 'stopovers' for NASA when it needs them.

In your opinion, what might be some of the advantages and disadvantages of space becoming more privatized? Explain.

3. The article quotes NASA Administrator Charles Bolden: “***Turning over low-Earth orbit transportation to private industry will… allow NASA to focus on an even more ambitious mission — sending humans to Mars.***”

Do you believe that one day humans will settle in space? Why or why not?

**Questions For On Line Exploration**

*Note:* The links below are listed at **www.lesplan.com/links** for easy access.

1. Watch the launch of the Boeing Starliner on June 5: **https://www.cbc.ca/player/play/video/9.6414794** [1:24]

2. Find out what went wrong with this mission.  
**https://www.cbc.ca/player/play/video/9.6487740** [3:47]  
**https://www.cbc.ca/player/play/video/9.6509618** [8:11]

What did you learn?

3. Why did NASA make the decision to have Starliner return to Earth without its crew?  
**https://www.cbc.ca/player/play/video/9.6503415** [9:54]

Do you agree with NASA's decision? Why or why not? Explain.

4. How did this mission go from 8 days to 8 months?   
**https://www.cbc.ca/player/play/video/9.6480182** [9:17]

What will astronauts Wilmore and Williams be doing with all of this extra time?

5. What is the plan for returning astronauts Wilmore and Williams to Earth?  
**https://www.yout-ube.com/watch?v=l6g3\_UrmlxY** [3:43]

6. Explore the NASA and ISS sites:  
**https://www.nasa.gov/  
https://www.nasa.gov/international-space-station/**

7. Learn more about Boeing Starliner spacecraft:  
**https://www.boeing.com/space/starliner**

8. Check out some of the everyday products that were developed using space exploration technology:  
**https://d2pn8kiwq2w21t.cloudfront.net/original\_images/infographicsuploadsinfographicsfull11358.jpg**

Which items surprised you?

**Putting It All Together**

**A. Write the letter that corresponds to the best answer on the line beside each question:**

\_\_\_\_\_\_ 1. **Which country was the first to put a human in space?** a) United States b) China  
 c) Japan d) United Kingdom  
 e) Soviet Union

\_\_\_\_\_\_ 2. **Which company built the Starliner?** a) Airbus b) SpaceX  
 c) Boeing d) Lockheed Martin  
 e) Tesla

\_\_\_\_\_\_ 3. **How many astronauts did the Starliner deliver to the ISS?** a) 1 b) 2  
 c) 4 d) 5  
 e) 7

**B.** Mark the statements **T** (**True**) or **F** (**False**). If a statement is **True**, write one important fact to support it on the line below. If a statement is **False**, write the words that make it true on the line below.

\_\_\_\_\_\_ 4. **True** or **False?** Neil Armstrong and Buzz Aldrin were the first to walk on the moon.

\_\_\_\_\_\_ 5. **True** or **False?** NASA has plans to refurbish the ISS so it can continue to be used.

\_\_\_\_\_\_ 6. **True** or **False?** NASA has relied on Russia's space program to transport astronauts to the ISS.

**C. Fill in the blanks to complete each sentence.**

7. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ competed in the Space Race. (4)

8. ISS: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Space Station.

9. NASA is turning its long-term mission focus to sending humans to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ .

**D. Respond to the following question in paragraph form. *(Use a separate sheet of paper if necessary.)***

10. *As you see it, is space exploration a worthwhile investment?* Give reasons to support your response.

**Assessment Rubric**

This rubric may be helpful in providing students with formative, strength-based feedback and/or assessing students’ responses holistically. This easy-to-modify activity is included in the doc file which you can download from:   
**www.lesplan.com/subscribers**

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| --- | --- | --- | --- | --- |
|  | **Emerging** | **Developing** | **Proficient** | **Extending** |
| **Supports thinking** | Answers or reflections are brief and include obvious facts/details/ evidence. | Answers or reflections are general and supported with some relevant facts/details/evidence. | Answers or reflections are clearly supported with specific, relevant facts/details/evidence. | Answers or reflections are insightful and supported with specific, relevant facts/details/evidence. |
| **Shows understanding** | Responses show a basic understanding of the text, topic, issue or message. | Responses are thoughtful and show a general understanding of the text, topic, issue or message. | Responses are thoughtful and show a complete understanding of the text, topic, issue or message. | Responses are insightful and show a deep understanding the text, topic, issue or message. May synthesize ideas or explain the ‘so what’. |
| **Thinks  critically** | Makes straightforward connections or inferences. Focuses on retelling. | Makes logical connections to self (T:S) and/or background knowledge (T:S). Inferences are logical | Makes meaningful connections to self. Considers ideas between texts (T:T).  Inferences are plausible. | Makes powerful connections that go between texts and/or beyond the text (T:W).  Inferences are plausible and insightful. |

