Articles and Questions

Each **free article** of ***What in the World?*** includes:

1) a PDF file

*and*

2) a Word file

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

This **Word** file allows students to complete assignments using a computer either at school or at home. Teachers can assign all or parts of the file by email attachment or a school website. The **Word** file also allows teachers to:

• easily modify and format content including changing *fonts* and text sizes

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<https://support.google.com/docs/answer/187189?hl=en&co=GENIE.Platform=Desktop>

**Shoot to the Moon**

It’s the brightest and largest object in the night sky. It bathes us in moonlight. Over 27 days, we watch it change in size and brightness. We feel its gravitational pull in the rise and fall of the Earth’s tides.

The Moon is the Earth’s only natural **satellite**. About 384,000 kilometres away, it orbits our planet. One trip takes 27.32 Earth days.

The Moon's temperature ranges from minus 248 degrees Celsius to plus 123 degrees Celsius. It has about one percent of the mass and 0.166 of the gravity of the Earth. So if you weigh 45 kilograms on Earth you’d weigh 7.5 kilograms on the Moon.

Ours is not the only moon in space. But our Moon is closest to us. And it’s the only place in space where humans have set foot.

**Exploring The Moon**

The **Soviet Union** landed the first uncrewed spaceship on the Moon in 1959. That event spurred the United States into action. U.S. President John F. Kennedy wanted to beat the Soviets by landing the first human on the Moon.

He succeeded. On July 20, 1969, Apollo 11 astronauts Neil Armstrong and Edwin “Buzz” Aldrin took "a giant leap for mankind" onto the dusty lunar surface.

Over the next three years, five other Apollo missions delivered U.S. astronauts to the Moon. They brought back 382 kilograms of rock and soil to study.

The last human landing was in 1972. However, uncrewed lunar expeditions resumed in the 1990s. The U.S. National Aeronautics and Space Administration (NASA) sent robots to probe the Moon. So did the European Space Agency (ESA), Japan, China, and India.

Then in 2019, NASA announced the Artemis Lunar Exploration Program. It's an ambitious new program to send humans back to the Moon.

**Artemis I**

The first mission was scheduled to launch from the Kennedy Space Center in Cape Canaveral, Florida on August 29. That's when a very powerful rocket, the Space Launch System (SLS), was set to lift the Orion spacecraft into lunar orbit.

This test flight was uncrewed. The only passengers were three **mannequins**. The mission was scheduled to take four to six weeks. Then the spacecraft was expected splash down off the coast of Baja, California.

During Artemis 1, Orion was supposed to fly farther, and remain in space longer without docking, than any other spacecraft built for humans. It was also expected to return home faster and hotter than ever before, reentering Earth's atmosphere at 11 kilometres per second and producing temperatures of approximately 2760 degrees Celsius.

"This is a mission that truly will do what hasn't been done and learn what isn't known," said Mike Sarafin, the Artemis 1 mission manager at NASA Headquarters.

**Future Missions**

Artemis 2 will be the first crewed mission. It is scheduled for 2024. Artemis 3 will take place in 2025 at the earliest. That's when astronauts will land on the Moon for the first time in over 50 years.

NASA plans to build a spaceport that will orbit the Moon for Orion to dock at. It's called the Gateway.

At the Gateway, astronauts will stay in HALO, short for Habitation and Logistics Outpost. HALO will provide their life support needs. Astronauts will travel to the Moon's surface via the Starship Human Landing System (HLS).

Eventually, NASA plans to build Artemis Base Camp. Four astronauts could then live and conduct science experiments on the Moon for up to two months. The base camp will likely be at the Moon’s South Pole. It will have a lunar cabin, a rover, and a mobile home.

**Joint Effort**

NASA is leading the Artemis program. However, others are playing a role. They include ESA, the Canadian Space Agency (CSA), and the Japan Aerospace Exploration Agency. Several companies are participating as well.

Canada is contributing Canadarm3. It's an improved version of the robotic arms we once built for the Space Shuttle fleet and the International Space Station. We're also providing a lunar rover. In exchange, CSA astronauts will take part in two missions to the Moon.

**Not Science Fiction**

A Moon base sounds like the stuff of science fiction, but NASA has an even bigger goal: to send astronauts to Mars by the 2030s or soon after.

Setting up a base on the Moon is a key step towards accomplishing this goal – but it's also an inspiring achievement on its own.

"To all of us who [sic] gaze up at the Moon, dreaming of the day humankind returns to the lunar surface – folks, we're here! We are going back," said NASA administrator Bill Nelson.

**Who Owns the Moon?**

Who governs the Moon? Who decides who can land on it, live on it, and mine its resources? For years, nations have debated these questions.

The Moon Agreement was drawn up in 1979. It was designed to prevent countries from making a profit on space resources. However, only a few countries **ratified** this agreement. They didn’t include the U.S., China, and Russia.

Now the U.S. has **unilaterally** drawn up the Artemis Accords. This is a set of guidelines for countries participating in its Artemis Project. Canada is one of eight countries that has signed these accords. Others have refused to do so. Why? They believe the U.S. is imposing rules to keep its leadership position on the Moon.

**mannequin** : a life-size model of a human body

**ratify** : to make an agreement official by signing it or formally accepting it

**satellite** : an object that travels in a path around another in space

**Soviet Union** : officially the Union of Soviet Socialist Republics (USSR). It was made up of 15 Soviet Socialist Republics, including Russia, before it broke apart in 1991.

**unilaterally** : (something) done by one country without considering what other countries think or want

 **Comprehension Questions**

1. How far away is the Moon?

2. How long does it take for the Moon to circle the Earth?

3. List at least three important facts about the Moon.

4. What event prompted the United States to send astronauts to the Moon in 1959?

5. What is the purpose of the **Artemis Lunar Exploration Program**?

6. Who is leading this program?

7. What is the purpose of the Artemis I mission?

8. How far was the Orion spacecraft scheduled to fly? How long was it expected to travel for?

9. When are the next two missions for the Artemis Lunar Exploration Program scheduled to occur?

10. What will Canada contribute to the Artemis Program?

 **Questions for Further Thought**

1. The article states that when Commander Neil Armstrong stepped onto the surface of the Moon during the Apollo 11 mission in 1969, he said, ***"That's one small step for man, one giant leap for mankind."***

As you see it, what is the significance of that statement today, more than 50 years after it was first said?

2. The article discusses the question of who owns the Moon. Why are some countries concerned about who has the right to explore the Moon? Why are some countries refusing to ratify common agreements? As you see it, how should Moon exploration be monitored? Give reasons to support your ideas.

3. Elon Musk, founder and CEO of SpaceX, and Jeff Bezos, owner of Blue Origin, have signed contracts with NASA for their companies' spacrafts to fly astronauts to the Moon. Mr. Bezos has stated, "***We’re not going back to the Moon to visit. We’re going back to the Moon to stay.***” Mr. Musk has stated, "***I think we’ve got potential for an incredibly exciting future in space, with a base on the Moon and ultimately sending people and having a self-sustaining city on Mars.***"

What are your thoughts about having self-sustaining settlements on the Moon and Mars? Are they realistic? Are they desirable? What might some considerations and challenges be?

4. In Greek mythology, Artemis was the twin sister of the god Apollo. As you see it, what is the significance of the choice of name for NASA's new project to put astronauts on the Moon?

 **Questions For Online Exploration**

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

1. Visit any of the following sites to learn more details about how the Artemis Project will happen:
**https://www.yout-ube.com/watch?v=qMMguZLZxhk** [5:31][**https://www.yout-ube.com/watch?v=XcPtQYalkcs**](https://www.yout-ube.com/watch?v=XcPtQYalkcs) [8:48]

What additional information about the Artemis Project did you learn from these links? What questions do you still have?

2. Learn more about Canada's role in and contributions to the Artemis Project:
**https://www.cbc.ca/news/science/canada-artemis-moon-1.6552605
https://www.cbc.ca/player/play/2062875715871/** [6:14] **https://www.asc-csa.gc.ca/eng/astronomy/moon-exploration/canada-role.asp
https://www.yout-ube.com/watch?v=fVC7ZqC4Ff0&feature=youtu.be** [1:47]

As you see it, what does Canada's participation in this project mean for the future?

3. Find out more about Artemis I:
Artemis I map: **https://www.nasa.gov/image-feature/artemis-i-map**NASA Mission description: **https://www.nasa.gov/feature/around-the-moon-with-nasa-s-first-launch-of-sls-with-orion**

What three new facts did you learn?

4. Check out the scientific experiments that will be performed during Artemis I:
**https://www.yout-ube.com/watch?v=Qxxb4YeBTug** [3:44]

As you see it, what is the goal of these experiments?

 **Putting It All Together**

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

\_\_\_\_\_\_ 1. **Which of the following statements about the Moon is TRUE?** a) its gravity affects Earth's climate b) it takes 262 days to orbit the Earth
 c) humans have never visited the Moon d) it has about one percent of the Earth's mass

\_\_\_\_\_\_ 2. **Which powerful rocket will lift the Orion spacecraft into space?** a) Space Launch System b) Falcon 9
 c) Saturn V d) Sputnik

\_\_\_\_\_\_ 3. **Which program aims to send astronauts to the Moon for the first time since 1972?** a) the NASA Moon Project b) HALO
 c) the Gateway Moon Orbiter d) the Artemis Lunar Exploration Program

**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?** The United States was the first country to land a spaceship on the Moon.

\_\_\_\_\_\_ 5. **True** or **False?** A person weighs exactly half as much on the Moon as on Earth.

\_\_\_\_\_\_ 6. **True** or **False?** The first Artemis mission will not carry astronauts.

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

7. The Moon's \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ranges from -248 degrees Celsius to 123 degrees Celsius.

8. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 11 mission in 1969 was the first crewed spacecraft to reach the Moon.

9. NASA = U.S. National Aeronautics and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Administration.

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

10. As you see it, what is the significance of the Artemis program? Give reasons to support your response.