Tell Your Lunar Gateway Story: JavaScript Teacher Guide

Summary

- Coding skill level: **Advanced**
- Recommended grade level: **Grades 6-12 (U.S.), Years 7-13 (U.K.)**
- Time required: **50 minutes**
- Number of modules: **1 module**
- Coding Language: **JavaScript**

Teacher Guide Outline

Welcome!
- How to Prepare

Activity
- Overview
- Getting Started (20 minutes)
- DIY Module (30 minutes)
- Extended Activities

Going Beyond Tell Your Lunar Gateway Story
- Do More With Tynker
- Tynker for Schools

Help

Welcome!

The Tynker team is thrilled to bring you a series of Moon to Mars coding challenges based on NASA space missions. This is the second coding challenge of the series. Students will learn about the Lunar Gateway, a small spaceship that will orbit around the Moon and serve as a temporary home/work space for astronauts. Additionally, students will learn about the Artemis program, which will land American astronauts, including the first woman and the next man on the moon. You can read about the Lunar Gateway and Artemis program here:

- Lunar Gateway: https://www.nasa.gov/topics/moon-to-mars/lunar-gateway
- Artemis: https://www.nasa.gov/artemis

You can find more helpful websites in the "Help" section of this teacher guide.

The lesson is intended to be completed in two different parts (as described in the "How to Prepare" section of this teacher guide). In Part 1, students are introduced to NASA's plans for lunar exploration by completing a variety of fun activities. Additionally, students will need to complete "The Artemis Generation" assignment, which will allow you to assess your students' understanding. The assignment will also guide your students' thought process before they start coding their "Tell Your Lunar Gateway Story" Tynker project. You can find an answer key to "The Artemis Generation" assignment in the "Help" section.

In Part 2, students will combine their coding, innovation, and art skills as they complete the "Tell Your Lunar Gateway Story" project using Tynker Text Code Editor. Students are provided a tutorial with two sample projects to help guide their creative process as they complete the project. **Note:** This project is open-ended and research focused. Students are provided suggestions on how to get started, but need to use JavaScript and the HTML canvas to draw images and write text.

Once students finish creating their "Tell Your Lunar Gateway Story" projects, have them publish their project on Tynker for a chance to win a live video conference with a real NASA expert! The chance for your classroom to win ends at 11:59 PM PT on Sunday, October 13th, 2019. NASA and Tynker will judge and select winners.

How to Prepare

This activity is designed for self-directed learning. Your role will be to help students individually and facilitate as they complete the activities. The best way to prepare is to:

1. **Familiarize yourself with the material.** After selecting your Tynker lesson (e.g., Tell Your Lunar Gateway Story), read through this teacher guide and complete

the activity before assigning it to students. This will allow you to troubleshoot anything in advance and plan for potential questions from your students.

2. **OPTIONAL: Sign up for a teacher account.** Although an account is NOT required, creating a free teacher account will allow you to access teacher guides, answer keys, and tons of additional resources. You'll also be able to create free accounts for your students, monitor their progress, and see their projects.

3. **OPTIONAL: Create student accounts.** From your teacher account, you can easily create free student accounts for all your students. This will allow them to save their projects and progress, so they can continue coding when they get home! Again, this is not necessary to complete the "Tell Your Lunar Gateway Story" lesson.

4. **Complete this lesson in two different parts:**

Part 1:

Introduce students to NASA's plans for the Lunar Gateway and Artemis Generation by completing the activities below. **Note:** Your students don't have to complete all the activities. You can pick and choose the ones you feel are best suited for your students.

- Play this short NASA video that introduces the Artemis program: https://youtu.be/dOKKkV-30dE
  Here's a link to more Artemis videos: https://www.nasa.gov/artemis/videos
- Moon to Mars
- Ask students to read about...
    - NASA's plans to travel to the Moon before exploring Mars: https://www.nasa.gov/topics/moon-to-mars
    - The Lunar Gateway: https://www.nasa.gov/feature/questions-nasas-new-spaceship
    - The Moon's South Pole: https://www.nasa.gov/feature/moon-s-south-pole-in-nasa-s-landing-sites
  Once students finish reading the information from the different websites, ask them to journal 3-5 takeaways. What fun facts did they learn? What did they find interesting? Do they have lingering questions about what they read?
- Are your students curious about the hazards of human spaceflight? They can read about them here: https://www.nasa.gov/feature/5-hazards-of-human-spaceflight
- Have students try out the NASA Forward to the Moon with Artemis Explorer Activities:

http://nasa.gov/exploreractivities

- Give students headphones, then have them check out the Gravity Assist Podcast: https://www.nasa.gov/gravity-assist
Inform students that Season 3 is about the Moon and Episode 10 discusses future lunar missions.
- Tell students that they're going to use Tynker in an upcoming activity to create their own project where they will imagine themselves as Artemis astronauts living and working on the Lunar Gateway. **Important:** Before students start coding, they need to complete the "Artemis Generation" assignment (located on the next page) for homework or as an in-class activity. You can also direct your students to the helpful websites listed in the "Help" section of this teacher guide to help them answer the questions in the worksheet.

Name _____

Date _____

Artemis Generation

Directions: Answer the questions below, then create an outline for your "Tell Your Lunar Gateway Story" project.

Questions:
1. List at least three goals for the Artemis lunar exploration program:

   _____

   _____

   _____

   _____

   _____

2. What is the Lunar Gateway?

   _____

   _____

   _____

   _____

3. List and briefly describe five hazards of sending humans into space:

   _____

   _____

   _____

   _____

   _____

4. Why do you think NASA chose the Moon's South Pole for the Artemis landing site?

   _____

   _____

   _____

   _____

   _____

   _____

5. What is your story going to be about? Below are questions to prompt ideas:

Guiding Questions
Once in lunar orbit, will you stay in the Lunar Gateway or will you travel to the lunar surface?
Will you conduct any robotic missions? What is the purpose of the mission? Describe your robotic mission.
Will you explore what resources exist on the surface of the Moon? Why? What tools will you need?
What will you learn as you explore the Moon's surface?
What technologies need to be developed to establish a sustainable presence on the Moon?
How do you know if the water is safe to drink or use?
How can water or ice be used for long-duration space travel?
How do we keep astronauts safe from the hazards of space travel?
How do we address the challenges of not having continuous and direct communication to Earth?

Note: You **do not** need to answer the "Guiding Questions." The purpose of this chart is to guide your creativity/inspiration for the project. However, you do need to answer the question below:

What is your story going to be about?

_____

_____

_____

_____

_____

_____

_____

_____

Optional: Use the space below to sketch images or brainstorm ideas.

Part 2:

Now that your students know more about Artemis and the Lunar Gateway, they're ready to bring their stories to life through coding! Remind students that they're going to use the Text Code Editor and JavaScript to create their own "Tell Your Lunar Gateway Story" project. They'll need to imagine themselves as Artemis astronauts living and working on the Lunar Gateway in the year 2024. Once students have finished creating their project using the Text Code Editor, have them publish their project for a chance to win a live video conference with a real NASA expert! The chance for your classroom to win ends at 11:59 PM PT on Sunday, October 13th, 2019.

Activity

Overview

Objectives

Students will...

- Research NASA topics such as the Lunar Gateway and Artemis lunar exploration program
- Apply coding concepts to create a "Tell Your Lunar Gateway Story" project

Materials

- Computers, laptops, or Chromebooks (1 per student)

Vocabulary

- **Code:** The language that tells a computer what to do
- **Sequence:** The order in which steps or events happen
- **Function:** A set of known actions that the computer can perform
- **HTML Canvas:** The HTML element that is used to draw graphics

U.S. Standards

- **CCSS-ELA:** RI.6.4, RI.6.7, SL.6.1, RI.7.4, SL.7.1, SL.8.1, RI.8.4, RI.9-10.5, RI.11-12.6
- **CCSS-Math:** MP.1
- **K12CS:** P1.1, P1.3, P2.1, P2.3-2.4, P3.2-3.3, P4.4, P5.1-5.2, P6.1-6.3, P7.2-7.3
- **CSTA:** 2-AP-13, 2-AP-17, 3A-AP-17, 3A-AP-11, 3A-AP-17
- **CS CA:** 6-8.AP.13, 6-8.AP.16, 6-8.AP.17, 9-12.AP.12, 9-12.AP.16
- **ISTE**: 1.c, 1.d, 4.d, 5.c, 5.d, 6.b

U.K. Standards

National Curriculum in England (computing):

- **Key Stage 3 (Years 7-9)**
  - Create, reuse, revise and repurpose digital artefacts for a given audience, with attention to trustworthiness, design and usability
  - Understand a range of ways to use technology safely, respectfully, responsibly and securely, including protecting their online identity and privacy; recognise inappropriate content, contact and conduct, and know how to report concerns
- **Key Stage 4 (Years 10+)**
  - Develop their capability, creativity and knowledge in computer science, digital media and information technology
  - Develop and apply their analytic, problem-solving, design, and computational thinking skills
  - Understand how changes in technology affect safety, including new ways to protect their online privacy and identity, and how to report a range of concerns identify a range of ways to report concerns about content and contact
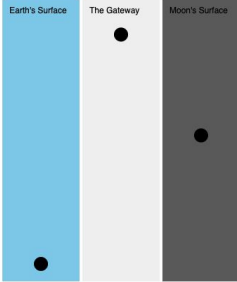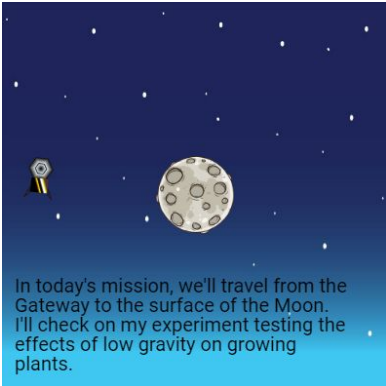
DIY Module (30 minutes)

This lesson has one DIY (do-it-yourself) module. Facilitate as students complete the Tell Your Lunar Gateway Story module on their own:

Tell Your Lunar Gateway Story (DIY)

- In this DIY, students will create an open-ended project that tells their story of their role as an Artemis astronaut using the Lunar Gateway. **Note:** This project is open-ended and research focused. Students will need to write their own code using JavaScript.
- The tutorial includes two sample projects. You can view the samples by clicking on the project images. Here's what they look like:

Samples	Image	Description
Sample 1: Gravity in Space	I wasn't ready for the feeling of weightlessness in space, despite our training. Living on Gateway means living in microgravity, which means we float around in the Gateway. The littlest push sends you flying. You have to remember to put things back where they belong, secure everything in place... otherwise your tools will float around the room and bang into you. Weirdest of all, there's really no up or down. Microgravity makes everyday living interesting! The Moon has some gravity, but it's so small compared to Earth. When you trip and fall on the moon, you fall very slowly! Jumping and running are fun, you can go so high. Earth's Surface / The Gateway / Moon's Surface	Students will read a story of an Artemis astronaut experiencing weightlessness in space. Students will also observe an animation that illustrates how gravity in space is different compared to Earth.
Sample 2: Lunar Landing!	In today's mission, we'll travel from the Gateway to the surface of the Moon. I'll check on my experiment testing the effects of low gravity on growing plants.	This is an animated presentation of an Artemis astronaut telling their story of their missions once they land on the moon.

- *Optional:* Model for your students how to utilize the tutorial and Text Code Editor. You can also play these short videos on how to...
    - Use the Top Editor Bar: https://www.youtube.com/watch?v=0jcaA9HMvv8
    - Use the Top Navigation Bar: https://www.youtube.com/watch?v=WNR1fn_CuKw
- Remind students to use their "Artemis Generation" assignment as a reference.
- Do students need help running their program?
    - Students can run their code's output by selecting this Play button, located at the top right corner of their screen:

    TUTORIAL   ► Play

- Make sure students are adding their code to the correct file(s).

Extended Activities (10 minutes each)

Show and Tell

Encourage students to share their projects with the class:

- Use your projector to display their unique projects. What obstacles and successes did they experience?
  .

Discussion

Ask students:

- What is something interesting you learned about the Lunar Gateway?
- What are some of the different functions you used?
- What questions do you have about the Lunar Gateway or Artemis lunar exploration program?

Going Beyond Tell Your Lunar Gateway Story

If your students enjoyed Tell Your Lunar Gateway Story, they're sure to enjoy the rest of what Tynker has to offer! Tynker offers a complete premium solution for schools to teach computer science. Over 400 hours of lessons are available to take K-8 students from block coding to advanced text coding. We offer tons of resources for teachers, including comprehensive guides, free webinars, and a forum to connect with other educators.

Do More with Tynker

With Tynker, kids don't just acquire programming skills--they explore the world of possibilities that coding opens up. Tynker has several interest-driven learning paths that make coding fun, both inside and outside the classroom:

- **Coding and Game Design:** Your students can use Tynker Workshop, a powerful tool for crafting original programs to make games, stories, animations, and other projects. They can even share their work with other kids in the Tynker Community.
- **Drones and Robotics:** Tynker integrates with connected toys, including Parrot drones and Lego WeDo robotics kits, so kids can see their code come to life.
- **Minecraft:** Tynker integrates with Minecraft so your students can learn coding through a game they love. Tynker offers skin and texture editing, as well as a custom Mod Workshop that lets kids try their original code in Minecraft.

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Tynker for Schools

Used in over 90,000 schools, our award-winning platform has flexible plans to meet your classroom, school, or district needs. All solutions include:

- Grade-specific courses that teach visual coding, JavaScript, Python, robotics and drones
- A library of NGSS and Common Core compliant STEM courses that are great for project-based learning
- Automatic assessment and mastery charts for whole schools and individual classes and students
- Easy classroom management with Google Classroom and Clever integration
- Professional training, free webinars and other teacher training resources

Need help getting Tynker started at your school? Contact us to learn more about teaching programming at your school with Tynker!

Help

Need help? Below you'll find answers to frequently asked questions about the Tell Your Lunar Gateway Story lesson.

How can I enter the competition?

Students will need to log into their Tynker account, then publish their "Tell Your Lunar Gateway Story" project. **Note:** Students can submit multiple projects--there is no limit!

When is the competition deadline?

The competition ends at 11:59 PM Pacific Time on Sunday, October 13th, 2019.

How are winners selected and what will they win?

NASA and Tynker will judge and select winners. If your student's project is selected, your classroom will win a live video conference with a real NASA expert!

Who is this activity for?

Tell Your Lunar Gateway Story is intended for students in grades 6-12 (U.S.) and years 7-13 (U.K.) with some coding experience.

Do I need to create Tynker Accounts for my students?

No, you do not need to create Tynker accounts for your students. Students can log in using their Google or Clever accounts.
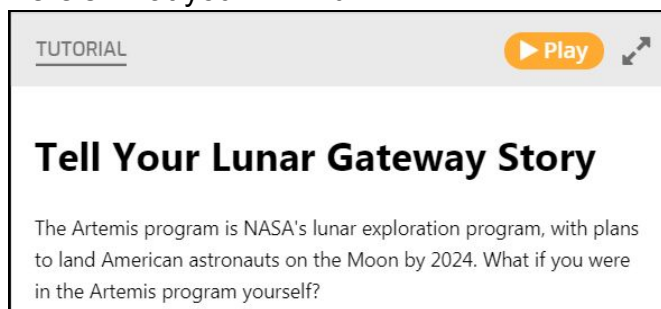
What devices do I need?

- Computers, laptops, or Chromebooks (1 per student) with an internet connection
- If not enough devices are available, students can work in pairs on the same device

What will my students learn?

Students will learn about the meaning behind NASA's human spaceflight plans for sending humans to the Moon and on to Mars. They will also use JavaScript and the HTML canvas to create an open-ended project that tells their story of their role as an Artemis astronaut using the Lunar Gateway. This lesson will reinforce JavaScript syntax and coding concepts as students experiment with with code. In this process, students will develop debugging and logical reasoning skills.

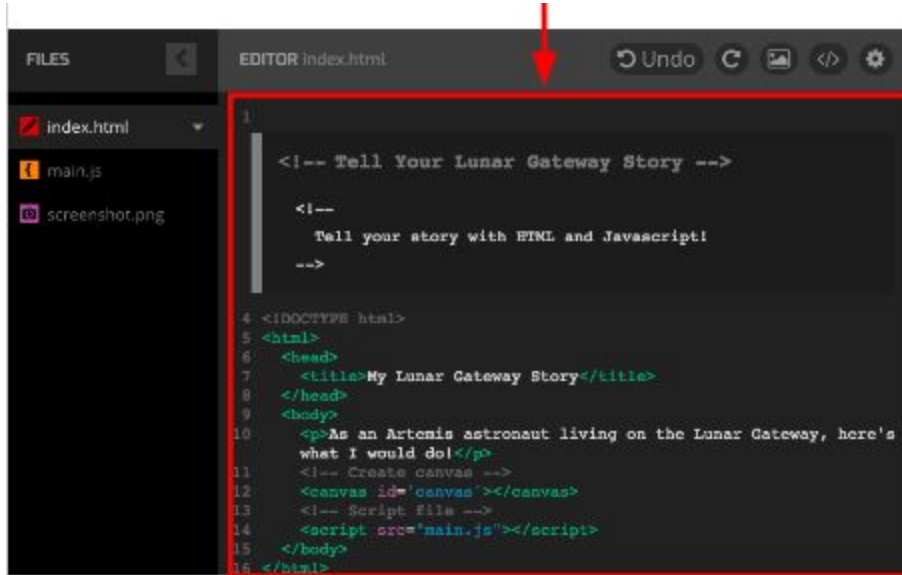## What does the tutorial include?

Here's what you will find:

TUTORIAL	▶ Play ⤢
Tell Your Lunar Gateway Story	
The Artemis program is NASA's lunar exploration program, with plans to land American astronauts on the Moon by 2024. What if you were in the Artemis program yourself?	

- Instructions to help guide your students' creative process

- 2 different sample projects

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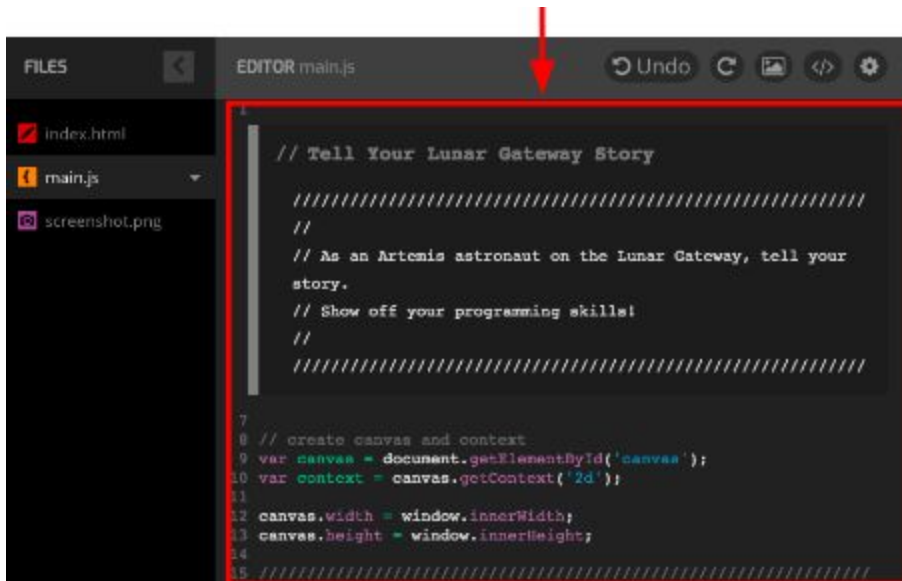
Where do my students edit their code?

Here's where they can add code to the **.html** file:

Here's where they can add code to the **.js** file:

What are some helpful websites I can refer to?

Below are websites you might find helpful:
- **Artemis Videos:** https://www.nasa.gov/artemis/videos

- **What is the Artemis Program:**
  https://www.nasa.gov/audience/forstudents/k-4/stories/nasa-knows/what-is-the-artemis-program-k4.html

- **Explore Moon to Mars:** https://www.nasa.gov/topics/moon-to-mars

- **Moon's South Pole in NASA's Landing Sites:**
  https://www.nasa.gov/feature/moon-s-south-pole-in-nasa-s-landing-sites

- **Hazard of Human Spaceflight:**
  https://www.nasa.gov/feature/5-hazards-of-human-spaceflight

- **What is the Artemis Program for Grades 5-8:**
  https://www.nasa.gov/audience/forstudents/5-8/features/nasa-knows/what-is-the-artemis-program-58.html

- **Moon's South Pole in NASA's Landing Sites**:
  https://www.nasa.gov/feature/moon-s-south-pole-in-nasa-s-landing-sites

- **Gravity Assist Podcast with Jim Green NASA Chief Scientist.** Season 3 is dedicated to the Moon. Episode 10 discusses what future lunar missions might look like: https://www.nasa.gov/gravity-assist

Do you have an answer key?

Below are suggested answers to "The Artemis Generation" assignment:

- **Question 1:** List at least three goals for the Artemis lunar exploration program.
  - **Suggested answer:**
    Artemis lunar exploration program goals:
    1. Search for the Moon's water and investigate ways to use it.
    2. Send astronauts to explore new areas on the Moon.
    3. Learn how humans can live and work in an environment beyond Earth. Ultimately, the information gathered from this mission will help us get closer to one day exploring Mars!
  - **Helpful website:**
    https://www.nasa.gov/audience/forstudents/5-8/features/nasa-knows/what-is-the-artemis-program-58.html

- **Question 2:** What is the Lunar Gateway?
  - **Suggested answer:** The Lunar Gateway is a small spaceship (smaller than a studio apartment) that will orbit the Moon. Astronauts will use the

Gateway as a housing unit and laboratory where they will conduct experiments and research the Moon.
- ○ **Helpful website:**
  https://www.nasa.gov/topics/moon-to-mars/lunar-gateway

- ● **Question 3:** List and briefly describe five hazards of sending humans into space:
  - ○ **Suggested answer:**

    Five hazards of sending humans into space:
    1. *Radiation*- Radiation exposure can potentially increase the risk of cancer, cause damage to the central nervous system, reduce motor function, cause behavioral changes, and cause a change in cognitive function.
    2. *Isolation*- Behavioral issues are common when humans are placed in a small space, and become more problematic over longer durations.
    3. *Distance from Earth*- A trip from Earth to the Moon takes roughly three days, whereas a trip from Earth to Mars will take about three years. If something goes wrong (e.g., equipment failure, medical emergency, shortage of food/supplies) during the mission, the crew does not have the option to return home within hours to fix the problem or resupply. They'll need to use their resources at hand and problem-solve to find a solution.
    4. *Gravity*- In space, astronauts are exposed to a variance of gravity compared to what their body experiences on Earth. Additionally, bones, muscles, and the cardiovascular system can all be potentially impacted by the lack of gravity in space.
    5. *Hostile/closed environments*- To maintain the physical and mental wellness of astronauts, it's important that astronauts live in an environment where they have enough food and are able to sleep/exercise. It's also important that factors such as temperature, pressure, lighting, and noise are regulated.
  - ○ **Helpful website:**
    https://www.nasa.gov/feature/5-hazards-of-human-spaceflight

- ● **Question 4:** Why do you think NASA chose the Moon's South Pole for the Artemis landing site?
  - ○ **Suggested answer:** The trip to Mars will guarantee new challenges for the team, and new challenges are sure to come by visiting the Moon's South Pole: a place where no one has been before. These parallels will

challenge explorers in similar ways, which can better prepare astronauts. The Moon's South Pole also provides astronauts the opportunity to search for the Moon's water and explore ways to use it. This is important because water is necessary for long-term exploration because of its many uses. For example, water ice can be used on space missions for drinking, cooling equipment, breathing, making rocket fuel, and more!

- ○ **Helpful website:**
  https://www.nasa.gov/feature/moon-s-south-pole-in-nasa-s-landing-sites

How can I contact the Tynker support team?

If you have any issues or questions, send us an email at support@tynker.com.