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!

In this lesson, 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 "Getting Started" 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. There's also an optional "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.

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. **Get students excited about coding.** Inspire students and get them excited for the Hour of Code event. Here is a link to resources such as inspirational videos and posters from the Hour of Code website: https://hourofcode.com/us/promote/resources#videos
3. **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.

4. **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.
5. **OPTIONAL: Print certificates to hand out.** While signed in to your Tynker teacher account, you can print certificates by clicking on a classroom from your teacher dashboard, clicking the “Gradebook” tab, going to “Hour of Code,” and clicking the “Print All Certificates” button. This will only print certificates for student accounts assigned to the selected classroom.
6. **Complete this lesson in two different parts.** Please refer to the "Getting Started" section of this teacher guide.

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, 3B-AP-11
- **CS CA:** 6-8.AP.13, 6-8.AP.16, 6-8.AP.17, 9-12.AP.12, 9-12.AP.16
- **Illinois CS:** 6-8.AP.11, 6-8.AP.14, 6-8.AP.17, 6-8.AP.18, 9-10.AP.17, 11-12.AP.13
- **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

Getting Started (20 minutes)

The lesson is intended to be completed 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
- 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
  - NASA Lunar in-situ resource utilization (ISRU): https://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20190032062.pdf

- 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.
- *Optional:* Before students start coding, ask them to complete the "Artemis Generation" assignment (located on the next page) 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.

Hour of Code
Tell Your Lunar Gateway Story

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:

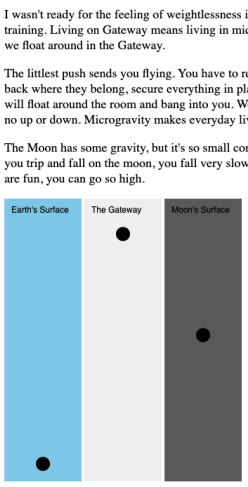
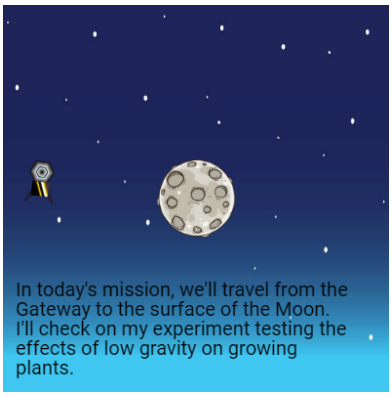
Now that your students know more about Artemis and the Lunar Gateway, they're ready to bring their stories to life through coding! Remind students that they're going to use the Text Code Editor and JavaScript to create their own "Tell Your Lunar Gateway Story" project. They'll need to imagine themselves as Artemis astronauts living and working on the Lunar Gateway in the year 2024.

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		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!		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:

- 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?

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Discussion

Ask students:

- What are some of the different functions you used as you coded your project?
- What questions do you have about the Lunar Gateway or Artemis lunar exploration program?

Reflection

Share the following "takeaway" examples with students:

- Robots will be instrumental in assembling and maintaining a lunar base.
- The richer water deposits on the Moon are in the form of ice in dark craters.
- The Moon is a stepping stone to Mars.

Next, ask students to write 3-5 of their own takeaways about NASA, lunar exploration, or the Lunar Gateway.

Going Beyond an Hour

If your students enjoyed an Hour of Code, 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.

More Hour of Code Activities

Tynker offers many other tutorials for the Hour of Code, including STEM Hour of Code lessons that you can integrate into the subjects you already teach. Check out the main Tynker Hour of Code page to see all the tutorials!

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.

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.

Hour of Code
Tell Your Lunar Gateway Story

What is Hour of Code?

The Hour of Code is a global learning event in which schools and other organizations set aside an hour to teach coding. No prior coding experience from you or your students is needed! The event is held every December during Computer Science Education Week. You can also organize an Hour of Code year-round. The goal of the Hour of Code is to expand access to computer science education for people of all backgrounds. Learning computer science helps students develop logic and creativity, and prepares them for the changing demands of the 21st century. Tynker has been a leading provider of lessons for the Hour of Code since the event began in 2013. Since then, over 100 million students from 180 countries have finished an Hour of Code.

How do I prepare for Hour of Code?

1. **Familiarize yourself with the material.** After selecting your Hour of Code lesson (e.g., Tell Your Lunar Gateway Story), read through the 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. **Get students excited about coding.** Inspire students and get them excited for the Hour of Code event. Here is a link to resources such as inspirational videos and posters from the Hour of Code website: https://hourofcode.com/us/promote/resources#videos
3. **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.
4. **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 an Hour of Code.
5. **OPTIONAL: Print certificates to hand out.** While signed in to your Tynker teacher account, you can print certificates by clicking on a classroom from your teacher dashboard, clicking the "Gradebook" tab, going to "Hour of Code," and clicking the "Print All Certificates" button. This will only print certificates for student accounts assigned to the selected classroom.

How can Tynker help me manage my Hour of Code?

Tynker has several free features for registered teachers that will help you manage your Hour of Code. If you set your students up with a Tynker classroom, you will be able to track their progress and print Hour of Code completion certificates for them to keep.

How do I open Tell Your Lunar Gateway Story?

Have your students go to this URL: tynker.com/hour-of-code

Hour of Code
Tell Your Lunar Gateway Story

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.

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.

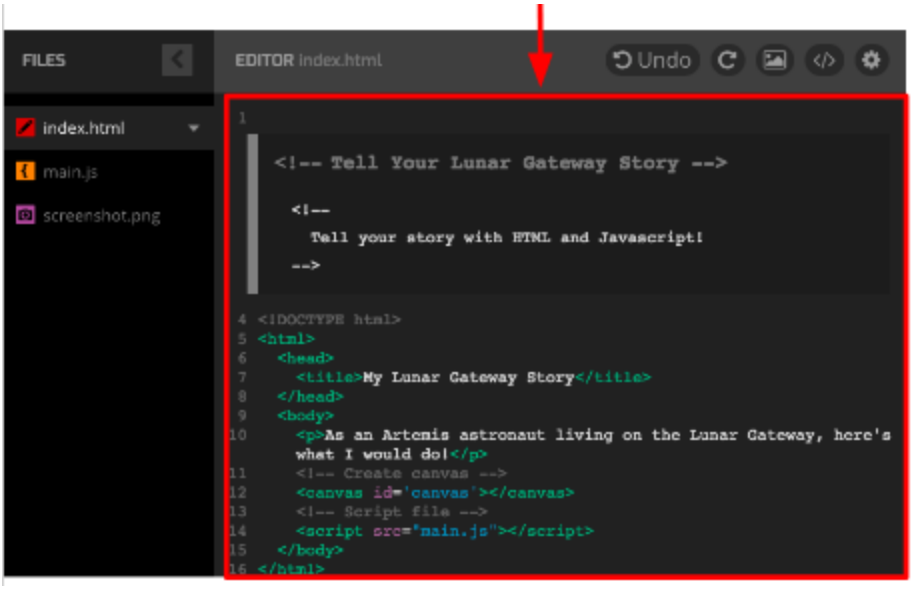
What does the tutorial include?

Here's what you will find:

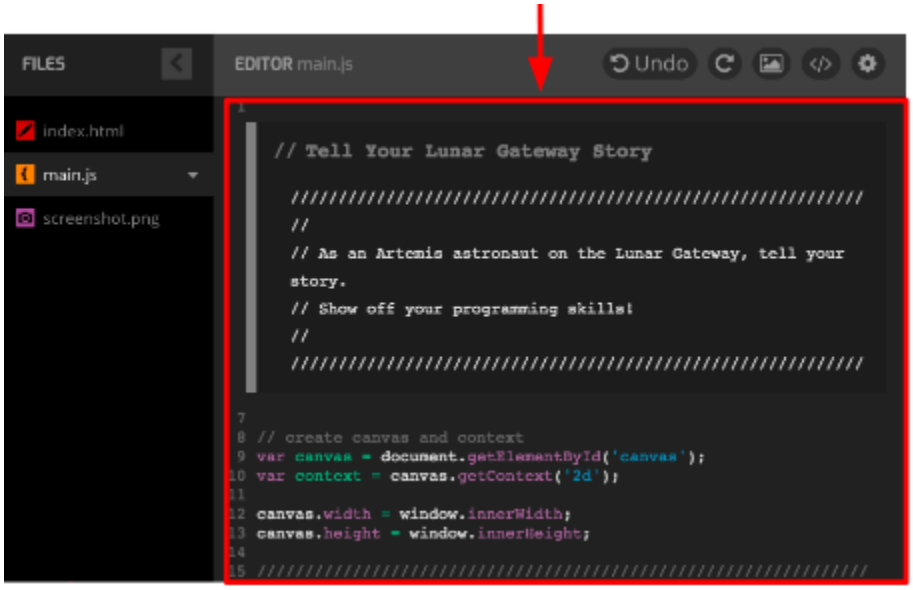
- Instructions to help guide your students' creative process
- 2 different sample projects

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.