Design a Mission Patch: Teacher Guide

Summary

- Coding skill level: **Beginner**
- Recommended grade level: **Grades 1-8 (U.S.), Years 2-9 (U.K.)**
- Time required: **50 minutes**
- Number of modules: **1 module**
- Coding Language: **Tynker Blocks**

Teacher Guide Outline

Welcome!
- How to Prepare

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

Going Beyond an Hour
- Do More With Tynker
- Tynker for Schools

Help

TYNKER™
CODING FOR KIDS

Welcome!

NASA is launching a series of missions, the Artemis missions, to return humans to the surface of the Moon. The Artemis missions will demonstrate NASA's commitment and capability to extend human existence deeper into the solar system. Artemis I is the first in a series of increasingly complex missions that will enable human exploration to the Moon and Mars. Artemis I is an uncrewed flight test of the systems needed for human exploration of deep space. These systems are the Orion spacecraft, the Space Launch System (SLS) rocket and the ground systems at Kennedy Space Center in Cape Canaveral, Florida. Artemis II will be the first crewed flight of SLS and Orion, sending four astronauts to the lunar environment for the first time in over 50 years. Orion will travel 4,600 miles beyond the far side of the Moon before returning home. Artemis II paves the way for Artemis III, which will land the first woman and first person of color on the surface of the Moon. NASA will then use knowledge gained from Artemis to send humans to our planetary neighbor, Mars.

This is an incredible time in human spaceflight. And spaceflight is much more than astronauts. Spaceflight involves scientists, engineers, IT specialists, human resources specialists, accountants, writers, technicians and many other kinds of people working together to break barriers to achieve the seemingly impossible. Students and teachers in today's classrooms and everyone who is inspired by and believes in this bold mission are the ones who are going to make Artemis and human exploration of deep space a reality. Together we are known as the Artemis Generation.

Mission patches are emblems designed and worn by astronauts and people affiliated with a mission. They are a part of NASA's history and culture. After NASA selects a crew for a mission, one of the first jobs of the new crew is to create a mission patch that represents themselves and the mission. In this lesson, students will learn about the history and process of creating NASA mission patches as they design and animate their own Artemis Generation mission patch using Tynker. Additionally, students will reinforce concepts such as drawing Actors, direction and turning, simple/advanced motion, visibility, resizing Actors, graphic effects, simple events, and input/output. It is recommended that you complete this lesson in two different parts (as noted in the "Getting Started" section of this teacher guide).

Have you ever noticed the mission patches on an astronaut's spacesuit? Here are a few examples:

Patch Image	Mission
	Artemis I
	Apollo
	ISS - Expedition 65
	Space Shuttle

Image references: www.history.nasa.gov/mission_patches.html; https://www.nasa.gov/feature/artemis-i-identifier; https://www.flickr.com/photos/nasa2explore/50926177133/

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, 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 Design a Mission Patch 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...

- Use code blocks to create an animated Artemis Generation mission patch
- Apply coding concepts such as drawing Actors, direction and turning, simple/advanced motion, visibility, resizing Actors, graphic effects, simple events, and input/output

Materials

- **For web:** Computers, laptops, or Chromebooks (1 per student)
- **For mobile:** iPads or Android tablets (1 per student)
- Paper and markers

Vocabulary

- **Code:** The language that tells a computer what to do
- **Sequence:** The order in which steps or events happen

- **Command:** A specific action or instruction that tells the computer to do something
- **Actor:** A Tynker character or object that can talk and interact with others
- **Stage:** The background of the project where the Actors are placed
- **Loop:** An action that repeats one or more commands over and over
- **Infinite loop:** A loop that repeats forever and does not end until the program stops

U.S. Standards

- **CCSS-ELA:** RI.1.7, RF.1.4, RF.1.4.A, SL.1.1, RI.2.7, RF.2.4, RF.2.4.A, SL.2.1, RI.3.7, RF.3.4, RF.3.4.A, SL.3.1, RF.4.4.A, RF.1.4.A, RF.4.4, SL.4.1, RF.5.4.A, RF.5.4, SL.5.1, RI.6.4, RI.6.7, SL.6.1, SL.7.1, SL.8.1
- **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:** 1A-AP-09, 1A-AP-10, 1A-AP-11, 1A-AP-12, 1A-AP-13, 1B-AP-11, 1B-AP-12, 1B-AP-14, 2-AP-13, 2-AP-16, 2-AP-17
- **CS CA:** K-2.AP.12, K-2.AP.13, K-2.AP.14, K-2.AP.15, K-2.AP.16, 3-5.AP.10, 3-5.AP.13, 3-5.AP.14, 3-5.AP.17, 6-8.AP.13, 6-8.AP.16, 6-8.AP.17
- **Illinois CS:** K-2.AP.09, K-2.AP.10, K-2.AP.11, K-2.AP.12, K-2.AP.13, K-2.AP.14, 3-5.AP.11, 3-5.AP.12, 3-5.AP.14, 6-8.AP.11, 6-8.AP.14, 6-8.AP.17, 6-8.AP.18
- **ISTE**: 1.c, 1.d, 4.d, 5.c, 5.d, 6.b

U.K. Standards

National Curriculum in England (computing):

- **Key Stage 1 (Year 2)**
  - Understand what algorithms are, how they are implemented as programs on digital devices, and that programs execute by following precise and unambiguous instructions
  - Create and debug simple programs
  - Use logical reasoning to predict the behaviour of simple programs
  - Use technology purposefully to create, organise, store, manipulate and retrieve digital content
  - Recognise common uses of information technology beyond school
  - Use technology safely and respectfully, keeping personal information private; identify where to go for help and support when they have concerns about content or contact on the internet or other online technologies
- **Key Stage 2 (Years 3-6)**
  - Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs
  - Understand computer networks, including the internet; how they can provide multiple services, such as the World Wide Web, and the opportunities they offer for communication and collaboration

    - Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact
- **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

Getting Started (20 minutes)

The lesson is intended to be completed in two different parts:

Part 1:

Introduce students to NASA's mission plans by completing the following activities:

- Check out NASA Artemis activities for students: https://stem.nasa.org/artemis/#activities
- Play this short NASA eClips™ video that explains how NASA astronauts design their mission patches: https://www.youtube.com/watch?v=KF3d_9zMGSo.
- As a class, look at the different patches from previous NASA space missions:
    - Artemis I Mission Patch: https://www.nasa.gov/feature/artemis-i-identifier
    - ISS mission patches: https://www.nasa.gov/mission_pages/station/expeditions/past.html
    - Apollo mission patches: https://history.nasa.gov/apollo_patches.html
    - *Optional:* You can read about the meaning of the Apollo mission patches here:
        - https://history.nasa.gov/SP-4029/Apollo_18-18_Mission_Insignias.html
        - https://www.nasa.gov/feature/the-making-of-the-apollo-11-mission-patch
    - Get students excited to learn about NASA's Artemis mission and STEM by playing this video (narrated by Star Wars actress Kelly Marie Tran): https://www.youtube.com/watch?v=_T8cn2J13-4
    - *Optional:* Before students start coding, ask them to complete the "Mission Patch Design" assignment (located on the next page) as an in-class activity:

Hour of Code
Design a Mission Patch

Name _____
Date _____

Artemis Generation: Mission Patch Design

Directions: Answer the questions below, then create an annotated sketch of your mission patch. Here are links you can use as inspiration:

- https://www.nasa.gov/mission_pages/station/expeditions/past.html
- https://history.nasa.gov/apollo_patches.html
- https://www.nasa.gov/specials/artemis/
- https://www.nasa.gov/specials/artemis-team
- https://www.youtube.com/watch?v=DMyyab4W_y8

Questions:

1. Is the shape of your patch a circle, triangle, or something else?

   _____

2. Real mission patches often include the astronauts' names, the vehicle they're going to pilot, or symbols of their mission. What images are you going to include? What do the images symbolize?

   _____

   _____

   _____

   _____

3. Which Tynker Actor(s) are you going to animate? Are they going to twinkle? Move? Change colors?

   _____

   _____

   _____

   _____

   _____

Hour of Code
Design a Mission Patch

Mission Patch Design: Create an annotated sketch of your mission patch in the box below. Remember, your mission patch is for an Artemis Generation mission.

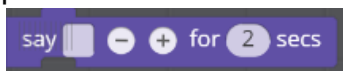
Part 2:
Remind students that they're going to use Tynker to create their own animated mission patch. Now that they know more about mission patches and the future of human spaceflight, they're ready to move on to the DIY module and bring their mission patch to life through coding!

DIY Module (30 minutes)

This lesson has one DIY (do-it-yourself) module. Facilitate as students complete the Design a Mission Patch module on their own:

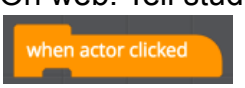
Design a Mission Patch (DIY)

- In this DIY, students will create an animated Artemis Generation mission patch. Additionally, they will need to add a couple of sentences to explain their patch. Tell students to follow the step-by-step instructions and drag code blocks to the center coding area.
- *Optional:* Show students the provided example by clicking (for web)/ tapping (for mobile) on the example project image on the tutorial.
- Remind students to use their annotated sketch as a reference. Also check that they use the "say" block to include a couple of lines describing their mission patch. Here's what the "say" block looks like:



- Point out to students that they will need to draw individual Actors for the parts they want to animate.
- Are students struggling to draw their own Actors ("Step 3" of the tutorial)?
  - Ask students to watch the Tynker support video on how to draw their own Actor: https://www.tynker.com/support/videos.
  - If students do not want to draw an Actor, they can add an Actor from the Media Library.
- Do students want to enhance their project? Direct their attention to "Step 8" of the tutorial, which includes different ideas on how they can make their project even more unique. Here are some hints to help your students get started:
  - **Change the background of the Stage-** Students can draw their own background or select one from the Media Library.
  - **Add music and sound effects-** Tell students to experiment with the "play sound" code block. Here's what it looks like:

  - **Make Actors do something when clicked (web)/tapped (mobile)-**
    - On web: Tell students to add a "When Actor Clicked" block:



    - On mobile: Tell students to add a "When Actor Touched" block:

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. Ask them to describe the meaning behind the pictures they used. Do the colors have meaning too? Which code blocks did they use to animate their Actor(s)?

Discussion

- Tell students to go to the following link and write down at least 5 interesting facts: https://www.nasa.gov/specials/artemis/
- After students finish writing down their 5 facts, ask them to share them with a neighbor.
- As a class, discuss NASA's plans to land the first woman and first person of color on the surface of the Moon by 2024. You can also discuss NASA's plans to use lunar exploration as a springboard for human exploration of Mars. What do your students find interesting? What are some obstacles they anticipate NASA encountering?

Trivia

Ask students if they believe the following statements are true or false:

- **True or false:** Only the NASA astronauts design the mission patch. (Answer: False. The design team includes several different people such as the crew, flight control, and NASA management.)
- **True or false:** Mission patches can be any shape. (Answer: True.)
- **True or false:** The mission patch shape, pictures, colors, and symbols all have meaning. (Answer: True.)

Optional: Encourage students to create 3-5 of their own "true or false" statements about mission patches, NASA, or the Moon. Then, quiz a friend.

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 80,000 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 Design a Mission Patch lesson.

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

Hour of Code
Design a Mission Patch

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., Design a Mission Patch), 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 Design a Mission Patch?

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

Who is this activity for?

Design a Mission Patch is intended for students in grades 1-8 (U.S.) and years 2-9 (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?

- **For web:** Computers, laptops, or Chromebooks (1 per student) with an internet connection
- **For mobile:** iPads or Android tablets (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 mission patches and NASA's human spaceflight plans for sending humans to the Moon and on to Mars. Additionally, students will create their own animated Artemis Generation mission patch using Tynker while reinforcing coding concepts (e.g., drawing Actors, direction and turning, simple/advanced motion, visibility, resizing Actors, graphic effects, simple events, input/output) and experimenting with new code blocks. In this process, students will develop debugging and logical reasoning skills.

How do my students code their Actors?

The Design a Mission Patch DIY module includes a workspace for students to code their project. The section on the left is a tutorial tab that provides step-by-step directions, describes what is happening for each step, and provides code blocks. Tell students to follow the step-by-step instructions and drag blocks to the center coding area.

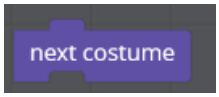
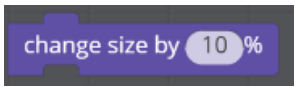
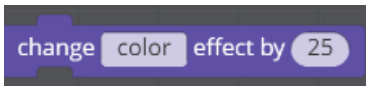
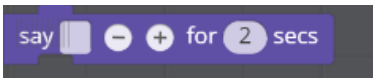
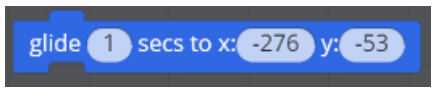
What do the code blocks do?

Below is pseudocode for the provided tutorial code blocks. **Note:** This is an open-ended project, where students are encouraged to explore and use additional code blocks.

Tutorial code blocks:

Code Blocks	What They Do
	Run the code attached to this block when the Play button is clicked.

Hour of Code
Design a Mission Patch

	Keep repeating the code inside this loop forever.
	Pause the current script for a specific number of seconds (e.g., 0.1).
	Make the Actor change to the next costume.
	Show the Actor on the Stage.
	Hide the Actor from the Stage.
	Change the size of the Actor by the specified percent (e.g., 10).
	Change the specified effect (e.g. color) by the specified value (e.g., 25).
	Make the Actor say the specified text for a specific number of seconds (e.g., 2).
	Rotate the Actor to the right (clockwise) by the specified value (e.g., 15).
	Rotate the Actor to the left (counterclockwise) by the specified value (e.g., 15).
	Move the Actor a specified number of units (e.g., 10) in the direction it is facing.
	Move the Actor to the specified x- and y-coordinates (e.g., -276, -52) within the specified seconds (e.g., 1).
	Point the Actor at the specified degree (e.g., 90).

How can I contact the Tynker support team?

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