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: **Block-based**

Teacher Guide Outline

Welcome!
- How to Prepare

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

Going Beyond Design a Mission Patch
- Do More With Tynker
- Tynker for Schools

Help

Welcome!

NASA is now on an ambitious mission to go Forward to the Moon, stay there, learn, and use what they learn to get humans even further from the Moon to all the way to Mars (see https://www.nasa.gov/moon2mars/ for more information). Over the next decade, NASA's plan is to build an open exploration architecture with as many capabilities that can be replicated as possible for missions to Mars.

The Tynker team is thrilled to bring you a series of Moon to Mars coding challenges based on NASA space missions. The first of these coding challenges is Design a Mission Patch, which gets students to bring their imagination to human spaceflight as they combine their coding and artistic skills.

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

Patch Image	Mission
	Apollo
	Space Shuttle
	ISS- Expedition 59

Image reference: www.history.nasa.gov/mission_patches.html

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 Moon mission patch using Tynker. Once students have finished creating their Moon mission patches, 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, May 5th, 2019. NASA and Tynker will judge and select winners. **Note:** It is recommended that you complete this

lesson in two different parts (as noted in the "How to Prepare" section of this teacher guide).

By the end of this lesson, students will have learned about the meaning behind NASA mission patches and NASA's human spaceflight plans for sending humans to the Moon and on to Mars, while reinforcing coding concepts (e.g., drawing Actors, direction and turning, simple/advanced motion, visibility, resizing Actors, graphic effects, simple events, input/output).

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., Design a Mission Patch), 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 Design a Mission Patch lesson.

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

   <u>Part 1:</u>
   Introduce students to NASA's mission plans by completing the following activities:
   - Have students try out the NASA Forward to the Moon Explorer Activities: http://nasa.gov/exploreractivities
   - 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:
     - 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.htm
  - https://www.nasa.gov/feature/the-making-of-the-apollo-11-mission-patch
- Tell students that they're going to use Tynker in an upcoming activity to design their own animated "Forward to the Moon" mission patch. Get students excited to learn about "Forward to the Moon" and STEM by playing this video: https://www.youtube.com/watch?time_continue=18&amp=&v=bivXt0hVufk
- Before students start coding, they need to complete the "Mission Patch Design" assignment (located on the next page) for homework or as an in-class activity:

Name _____

Date _____

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/moon2mars/
- https://www.youtube.com/watch?time_continue=18&v=bivXt0hVufk

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?

   _____

   _____

   _____

_____

_____

Mission Patch Design: Create an annotated sketch of your mission patch in the box below. Remember, your mission patch is for a "Forward to the Moon" 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! Their project must contain a few sentences describing the mission patch. Once students have finished creating their Moon mission patches using Tynker, 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, May 5th, 2019.

Activity

Overview

Objectives
Students will...
- Use code blocks to create an animated Moon 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
- **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
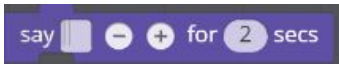
DIY Module (30 minutes)

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 "Forward to the Moon" 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:
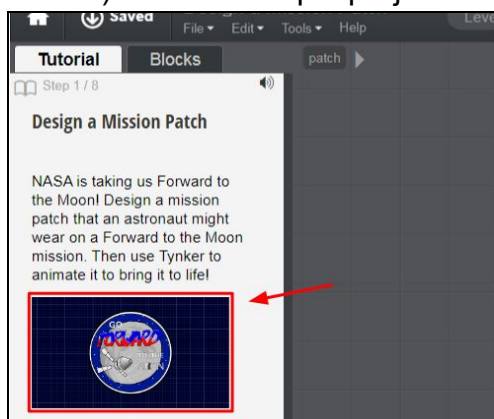
- Remind students to use their annotated sketch as a reference. Also check that they use the "say" block to include a couple of lines describing their mission patch. Here's what the "say" block looks like:

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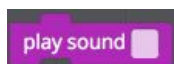
- ○ **Make Actors do something when clicked (web)/tapped (mobile)-**
  - ■ On web: Tell students to add a "When Actor Clicked" block:

  - ■ 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/moon2mars/
- After students finish writing down their 5 facts, ask them to share them with a neighbor.
- As a class, discuss NASA's plans to return humans to the surface of the moon by 2024 and 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 Design a Mission Patch

If your students enjoyed Design a Mission Patch, 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.

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.

How can I enter the competition?

Students will need to log into their Tynker account, then publish their "Design a Mission Patch" 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, May 5th, 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?

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. Students can log in using their Google or Clever accounts.

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 Moon 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.

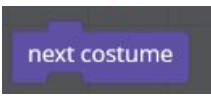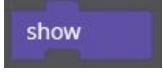# How do my students code their Actors?
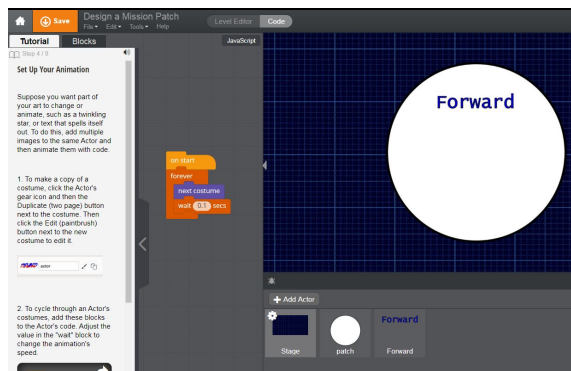
The Design a Mission Patch DIY module includes a workspace for students to code their project. The section on the left is a tutorial tab that provides step-by-step directions, describes what is happening for each step, and provides code blocks. Tell students to follow the step-by-step instructions and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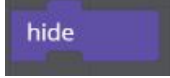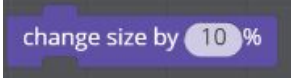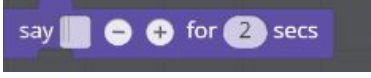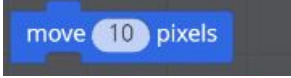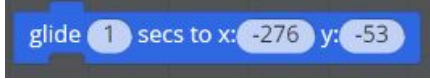
What do the code blocks do?

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.
	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	Hide the Actor from the Stage.
change size by 10 %	Change the size of the Actor by the specified percent (e.g., 10).
change color effect by 25	Change the specified effect (e.g. color) by the specified value (e.g., 25).
say for 2 secs	Make the Actor say the specified text for a specific number of seconds (e.g., 2).
turn ↻ 15 degrees	Rotate the Actor to the right (clockwise) by the specified value (e.g., 15).
turn ↺ 15 degrees	Rotate the Actor to the left (counterclockwise) by the specified value (e.g., 15).
move 10 pixels	Move the Actor a specified number of units (e.g., 10) in the direction it is facing.
glide 1 secs to x: -276 y: -53	Move the Actor to the specified x- and y-coordinates (e.g., -276, -52) within the specified seconds (e.g., 1).
point in direction 90 degrees	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.